

FINAL  
ENVIRONMENTAL IMPACT STATEMENT

INCREMENT II  
PROPOSED EWA MARINA COMMUNITY  
EWA, OAHU, HAWAII

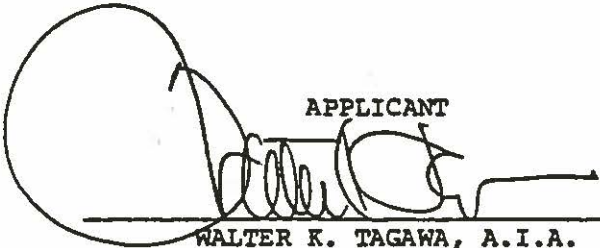
DAMES & MOORE PROJECT NO. 13822-001-11

**Dames & Moore**

FINAL  
ENVIRONMENTAL IMPACT STATEMENT

INCREMENT II  
PROPOSED EWA MARINA COMMUNITY  
EWA, OAHU, HAWAII

PREPARED PURSUANT TO:  
CHAPTER 343, HAWAII REVISED STATUTES

APPLICANT  
  
WALTER K. TAGAWA, A.I.A.  
PRESIDENT  
MSM & ASSOCIATES

PREPARED  
BY  
DAMES & MOORE

DECEMBER 5, 1985



## 1.0 COVER SHEET

### FINAL ENVIRONMENTAL IMPACT STATEMENT FOR INCREMENT II PROPOSED EWA MARINA COMMUNITY EWA, OAHU, HAWAII

This document is prepared as part of State and County permit actions relating to the proposed Ewa Marina Community Increment II Project. The format complies with the State Environmental Impact Statement (EIS) format requirements (Chapter 343, Hawaii Revised Statutes).

The zoning application for Increment II of the Ewa Marina Community was submitted concurrent with the Draft EIS. The Draft EIS was available for review from September 20, 1985 to November 7, 1985. This Final EIS incorporates the comments received on the Draft.

#### THE PROJECT AND ENVIRONMENTAL ASSESSMENT PROCESS

The proposed Ewa Marina Community is a planned, marine-oriented community for 15,000 residents. The total area of the proposed development is about 734.7 acres. The development will consist of 4,850 residential units on 25 different development areas. A 1,600 slip marina would be constructed within a 115 acre waterway. The marina would open to the ocean, affording access for public marina users and private residential users. About 66.9 acres of commercial development are also planned.

The entire project would be developed in two increments, Increment I would consist of about 169 acres. Increment II would consist of about 565.7 acres.

The entire Ewa Marina Community was the subject of a programmatic EIS in February 1981. The programmatic EIS was subsequently accepted by the City and County Department of Land Utilization (DLU), with the requirements that a supplemental EIS be prepared for each of the two planned increments. The supplemental EIS for Increment I was completed in March, 1984. This Increment II supplemental EIS builds upon the programmatic EIS and benefits from the information developed and presented in the Increment I supplemental EIS.

The development of Increment II requires environmental permits at the Federal, State and City and County levels. Each of the Federal, State and City & County permits require preparation of an EIS.

Discussions on the EIS and permitting process for Increment II were started in April, 1984 with the three major agencies having permit jurisdiction over Increment II: the DLU, the Department of Land and Natural Resources (DLNR), and the Corps of Engineers (COE). In addition, a scoping meeting was held in July, 1984 with 14 representatives of the State and City and County government. A meeting with DLU, DLNR, COE, and the State of Hawaii Office of Environmental Quality Control (OEQC) was held in September 1984 to

identify the permitting sequence for the required County, State, and Federal permits and the EIS procedure. Issues and procedures identified at these meetings were incorporated into the Notice of Preparation document issued on November 8, 1984.

The Notice of Preparation was submitted as a joint Federal/State document, and it was assumed that one EIS would be processed to address both Federal and State concerns. However, while preparing the Draft EIS, the COE chose to write their own document for Federal processing.

The COE Draft EIS for Increment II of the Ewa Marina Community, scheduled to be published late this year, will address COE concerns regarding the permit for the marina.

This Final EIS is required for the State Conservation District Use application (CDUA) and the county Shoreline Management Area application (SMA). The DLNR has indicated that they will require an additional Revised EIS for the project during the CDUA process, should the Final EIS accepted by DLU not adequately address DLNR concerns.

An anticipated schedule for processing of the EIS, the zoning change, SMA, and CDUA has been developed. This schedule is "idealized" in that dates that are established by the agencies involved (e.g. public hearing dates) have been selected based upon present anticipated dates. The actual dates will be established by the agency following review of submitted material.

EWA MARINA COMMUNITY INCREMENT II  
ANTICIPATED PERMITTING SCHEDULE

<u>ACTION</u>	<u>DEADLINE</u>
<u>CHAPTER 343 EIS PROCESSING</u>	
Issue Notice of Preparation	08 Nov 1984
End 30 Day Consultation Period	08 Dec 1984
Prepare DEIS (# days)	286
File DEIS	20 Sep 1985
End 45 Day Agency/Public Review	07 Nov 1985
Revise DEIS	19
File Revised EIS	05 Dec 1985
DLU Acceptance (14 Days after filing)	19 Dec 1985
<u>ZONING CHANGE PROCESSING</u>	
Application Submitted	20 Sep 1985
EIS Completed	22 Nov 1985
Application Accepted	22 Nov 1985
120 Day DLU Review Completed	22 Mar 1986
45-Day Planning Commission Review Completed	06 May 1986
Public Hearing	NA
City Council Review Ends (90 days)	04 Aug 1986
Change Approved	04 Aug 1986
<u>SHORELINE MANAGEMENT PERMIT</u>	
Start DLU Processing	NA
Application Accepted (After Zoning Change)	01 Jan 1986
Public Hearing (60 days after application)	02 Mar 1986
DLU Acceptance (120 Days after application)	01 May 1986
City Council Hearing	20 Aug 1986
Acceptance and Permit Issuance (30 days)	19 Sep 1986
<u>CONSERVATION DISTRICT USE APPLICATION</u>	
Application Submitted	01 Jul 1986
Application Accepted (w/SMA acceptance)	19 Sep 1986
EIS Required Notification	NA
Public Hearing	NA
CDUA Issued (180 days after acceptance)	28 Mar 1987

NA = not available at this time



## 2.0 SUMMARY

M.S.M. & Associates, Inc. proposes to develop Ewa Marina Community, Increment II, as a secondary urban area on the Ewa Plain. The community is planned as a water-oriented residential community. The purpose of the proposed project is to benefit the public by providing:

- Increased recreational resources both water-borne and shoreline;
- increased housing (3500 units) on the Ewa Plain to accommodate secondary urban area needs;
- more harbor facilities and boat slips;
- increased public access to the Ewa coastline;
- increased employment opportunities in the Ewa Plain area; and
- increased commercial and specialty shops for the Ewa area.

Environmental factors such as the shoreline recreational amenities; dry, mild and sunny climate; panoramic views; and flat topography are advantageous for development of a community.

The principal objective of the proposed Ewa Marina Community is to provide a planned, water-oriented residential community to serve the housing needs of a variety of income groups.

Another objective of the project is to provide boating facilities which are in limited supply on Oahu. A third objective is to achieve a community utilizing the cluster/planned development approach to housing. This concept would permit mixed housing types surrounded by a greenbelt system, maximizing open space within the development.

The overall Ewa Marina Community project, consists of two increments:

Increment I	148.6 acres residential
	2 acres commercial/public facility
	4.4 acres park
	14 acres arterial roadways
Increment II	307.5 acres residential
	64.9 acres commercial/public facility
	27.5 acres preservation
	115 acres marina
	20.3 acres park
	30.5 acres arterial roadways

A previous EIS was written to cover the Ewa Marina Community, in concept, and a previous supplemental EIS was written to cover Increment I. This EIS covers Increment II of the development.

Anticipated environmental impacts of Increment II consist of:

- Conversion of 115 acres of terrestrial land to marina.
- Creation of 115 acres of additional benthic habitat inside the marina.
- Creation of 4.9 miles of intertidal habitat along the perimeter of the marina.
- Loss of approximately 70,000 square feet of benthic habitat offshore (footprint of breakwaters)
- Creation of approximately 4,200 square feet of additional rocky habitat (breakwater)
- Creation of approximately 2,800 linear feet of rocky intertidal habitat (breakwater)
- Temporary loss of the benthic communities inhabiting approximately 146,700 square yards offshore due to dredging of the entrance channel.
- Alteration of the bathymetry within the entrance channel
- Loss of 400 feet of existing ocean frontage due to the creation of the entrance channel
- Loss of a portion of one surfing site.
- Creation of potential surfing sites.
- Natural drainage in the area will benefit with the creation of siltation/retention basins upstream of the project
- The long-term air quality of the area will be affected by additional pollutants from automobiles.
- Community generated noise in the area will be increased due to additional activities.
- The water supply needed for the area will increase.
- Most of the area will be transformed from agricultural to urban.
- Sixty-four archaeological features will be affected.
- Several archaeological features will be preserved and made accessible for the general public.

#### ORGANIZATION OF THE REPORT

This Final EIS is divided into three basic sections. Section 4.0 describes the proposed project and alternatives, Section 5.0 describes the existing environment, and Section 6.0 discusses environmental impacts of the proposed action. The subsequent sections, 7.0 through 10.0, comply with Chapter 343 HRS requirements.

Throughout the report, metric units and English units are used interchangeably and where deemed desirable, both units of measure are provided. A guide to the conversion of these units is provided in Appendix A. More commonly, however, metric units are used when the literature base tends to report data in metric units, and English units are used where the literature base tends to report data in English units. For example, air quality data is measured in micrograms per cubic meter, marine measurements are in feet, and generally land areas are reported in acres or square miles.



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#### 4.0 PROJECT DESCRIPTION AND ALTERNATIVES

##### 4.1 PROJECT SUMMARY

###### 4.1.1 Objectives

The location of the proposed Ewa Marina community is shown on Figure 4-1. The applicant believes environmental factors, such as the shoreline recreational opportunities; dry, mild and sunny climate; panoramic views; and flat topography, are advantageous for residential development. The residential community of Hawaii Kai, located next to the ocean with its meandering waterways and marinas, is an existing Oahu community comparable to the Ewa Marina Community.

The principal objective of the proposed Ewa Marina Community is to provide a planned water-oriented residential community and to serve the housing needs of a wide variety of income groups.

Another objective of the project is to provide additional boating facilities for the general public on Oahu. The waterways also will provide for a variety of water-oriented recreational activities for the general public.

A third objective is to achieve a community utilizing the cluster/planned development approach to housing. This concept would permit mixed housing types surrounded by a greenbelt system, maximizing open space within the development.

###### 4.1.2 General Description

Ewa Marina Community Increment II is envisioned as a 307.5-acre community with a total of 3,578 dwelling units, as well as appropriate commercial and public facilities to serve the daily needs of the residents. The proposed amenities to be provided in the community include:

- o Approximately 4.9 miles of frontage along interior waterways.
- o Approximately 115 acres of marina waters within the development.
- o Approximately 1,600 boat slips of which about 1,000 will be in the four major marina basins. The remaining 600 slips will be dispersed along the waterway system.
- o Park areas to include 20.3 acres of community parks to be dedicated to the City (in addition to the 30-acre Oneula Beach Regional Park which is within the project site).
- o A 27.5-acre preservation area.
- o Provision of a greenbelt throughout the community for pedestrian and cycling uses.
- o Approximately 100,000 square feet of commercial and 40,000 square feet of specialty shops for the Ewa area.



Densities would vary throughout the project from 5 to 33 units per acre. In addition to the residential and marina areas, there will be 64.9 acres of commercial and marina support area and 20.3 acres of park land, plus the existing 30-acre Oneula Beach Park located in the approximate center of the ocean frontage. The remaining property is dedicated to circulation and open space uses.

The proposed project is illustrated in Figure 4-2, and the layout of Increment II showing parcel size and planned densities is provided in Figure 4-3. The Ewa Development Plan Land Use Map is presented on Figure 4-4.

Provisions for off-site infrastructure to service the development will be made in concert with the City and County, State, and Federal government agencies, as well as the Estate of James Campbell.

The proposed project would create 25,900 lineal feet of marina waterfront. Of the 7,300 lineal feet of ocean frontage, 2,200 lineal feet would be in residential use, 1,400 lineal feet would be in commercial and public facilities use, and 3,700 lineal feet would be devoted to park and preservation uses. Presently, 2,500 of the 3,200 lineal feet is the existing Oneula Beach Park. The marina entrance channel at the shoreline would be 400 lineal feet wide.

#### 4.1.3 Phasing Plan

Increment II would be comprised of 16 residential parcels, five commercial and public facilities parcels, and the two proposed park sites and one preservation site. The residential and commercial parcels will be sold to subdevelopers/builders who in turn will subdivide respective parcels for residential and commercial developments. Parcels will be marketed as subdivision tract map approvals are obtained from the City and County of Honolulu. To a large extent, the timing for subdivision construction will be contingent upon prevailing market conditions. The project's development schedule is shown as Figure 4-5.

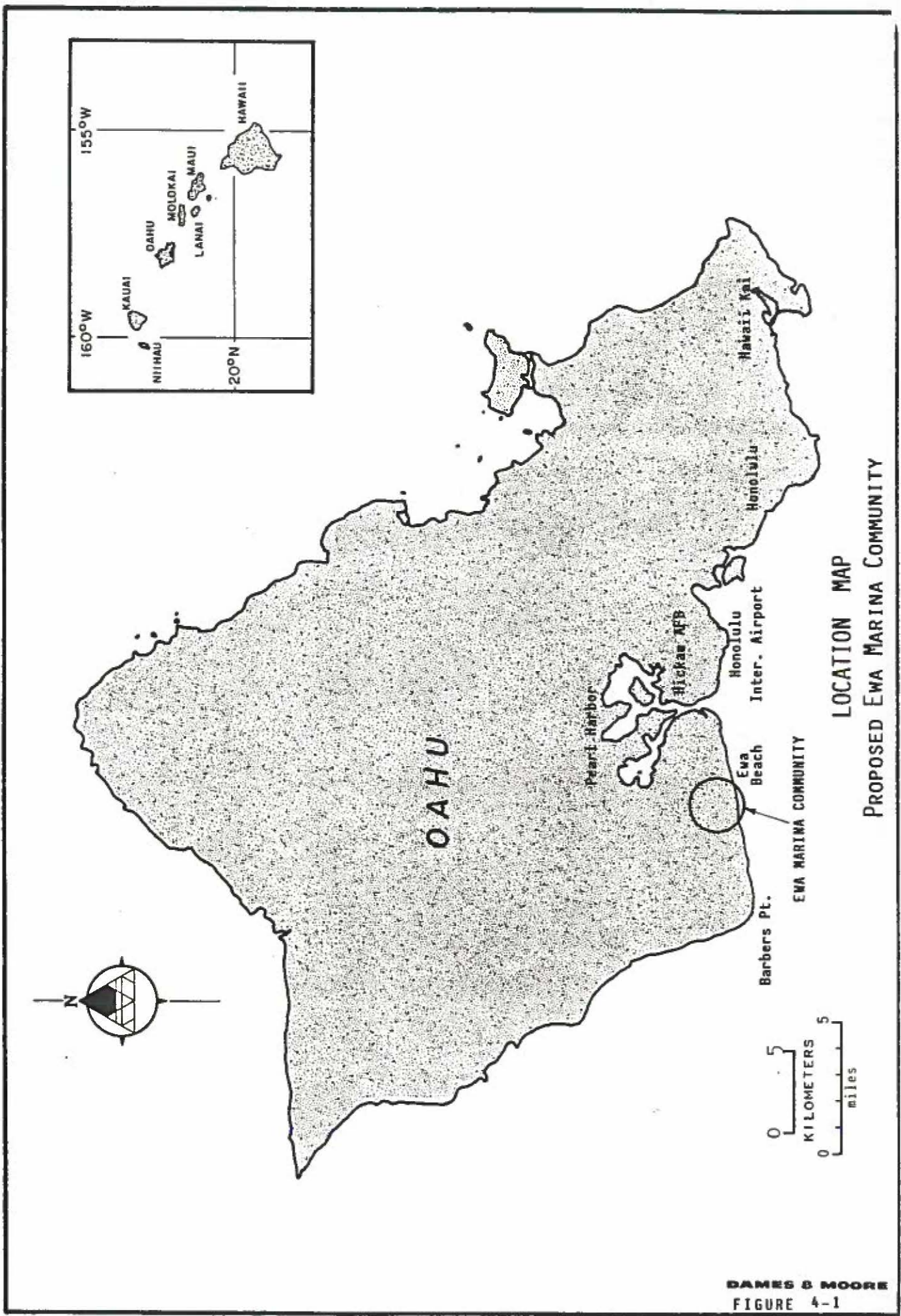
#### 4.1.4 Proposed Zoning

The proposed zoning for the Increment II of the Ewa Marina Community would include:

Residential	
R-6	206.0 Acres
A-1	64.5 Acres
A-2	37.0 Acres
Commercial/Public Facility	
PF	64.9 Acres
Preservation	
	27.5 Acres
	115 Acres (beneath Marina)
Parks	
	20.3 Acres
	30.0 Acres (existing Oneula Beach Park)

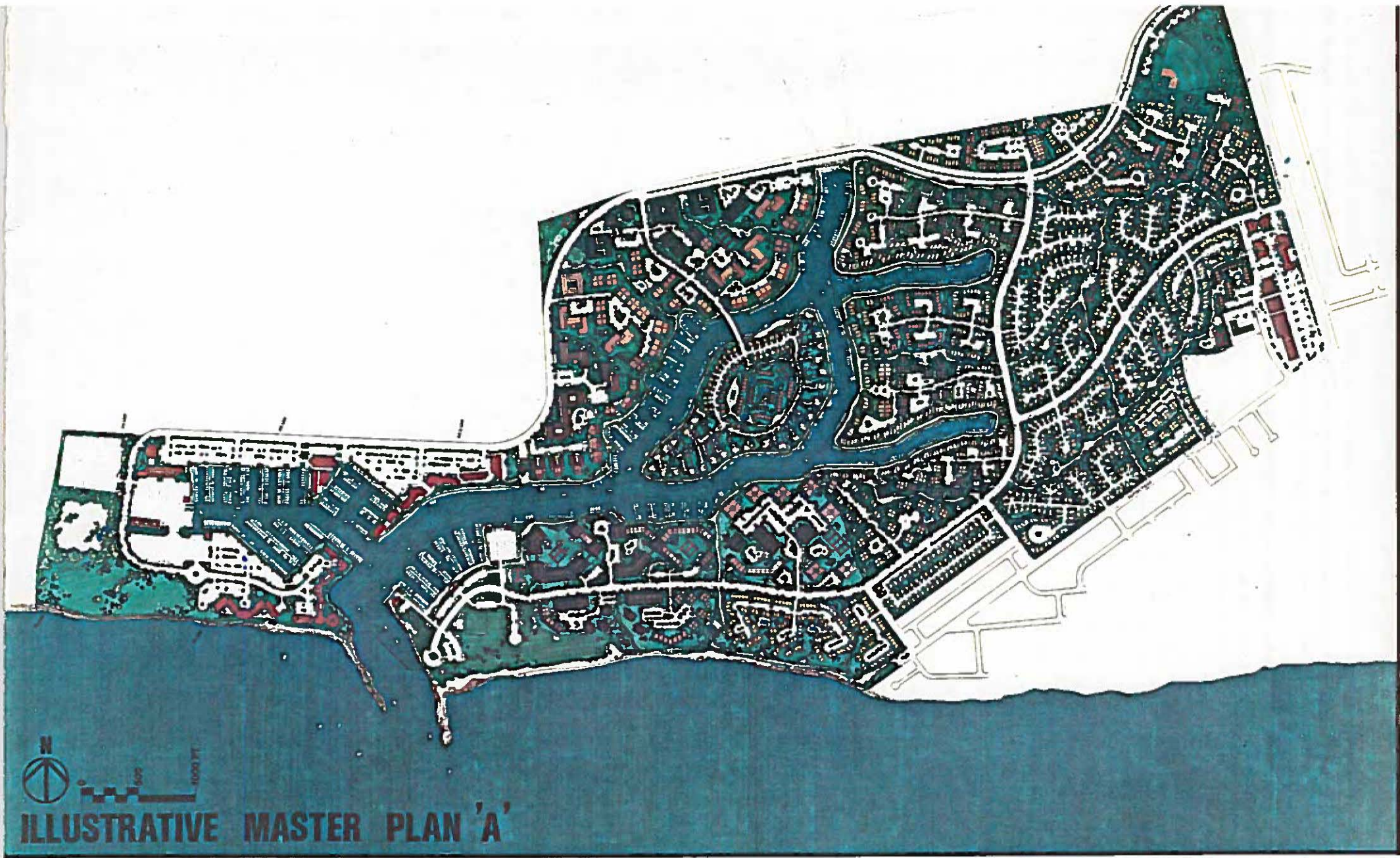
The land use/zoning plan is depicted in Figure 4-6.





LOCATION MAP  
PROPOSED EWA MARINA COMMUNITY





# **EWA MARINA COMMUNITY** **OAHU HAWAII**

MSM & ASSOCIATES INC	DATE	AUG 83
MASTER DEVELOPERS	PLATE NUMBER	
PEARSON & WUESTHOFF AIA AICP		4-2



PARCEL	RESIDENTIAL AREA & DENSITY
I	11.8 ac: 8 u/ac: 95 units
K	32.6 ac: 12 u/ac: 391 units
L	19.7 ac: 12 u/ac: 236 units
M	19.0 ac: 12 u/ac: 228 units
N	26.6 ac: 5 u/ac: 133 units
P	23.8 ac: 6 u/ac: 143 units
Q	18.6 ac: 33 u/ac: 614 units
R	9.2 ac: 10 u/ac: 92 units
S	21.7 ac: 10 u/ac: 217 units
T	10.0 ac: 6 u/ac: 60 units
U	11.7 ac: 7 u/ac: 82 units
V	20.7 ac: 7 u/ac: 146 units
W	12.1 ac: 10 u/ac: 121 units
X	19.8 ac: 14 u/ac: 278 units
Y	18.4 ac: 30 u/ac: 552 units
Z	31.8 ac: 6 u/ac: 190 units

TOTAL 307.5 ac 3,578 units

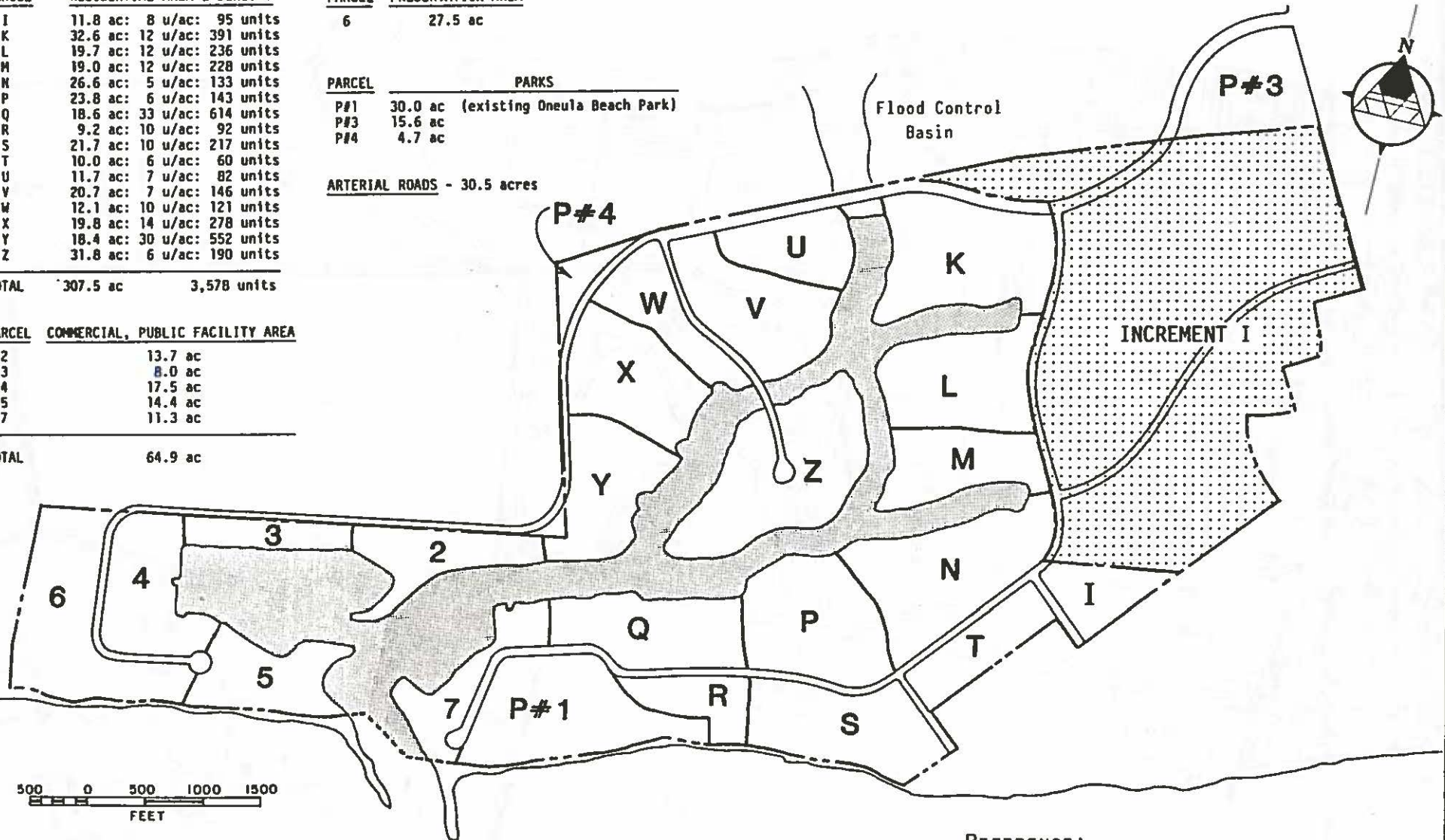
PARCEL	COMMERCIAL, PUBLIC FACILITY AREA
2	13.7 ac
3	8.0 ac
4	17.5 ac
5	14.4 ac
7	11.3 ac

TOTAL 64.9 ac

PARCEL	PRESERVATION AREA
6	27.5 ac

PARCEL	PARKS
P#1	30.0 ac (existing Oneula Beach Park)
P#3	15.6 ac
P#4	4.7 ac

ARTERIAL ROADS - 30.5 acres



## PARCEL AREA AND LAND USE MAP

INCREMENT II - EWA MARINA COMMUNITY

### REFERENCE:

MSM & ASSOCIATES

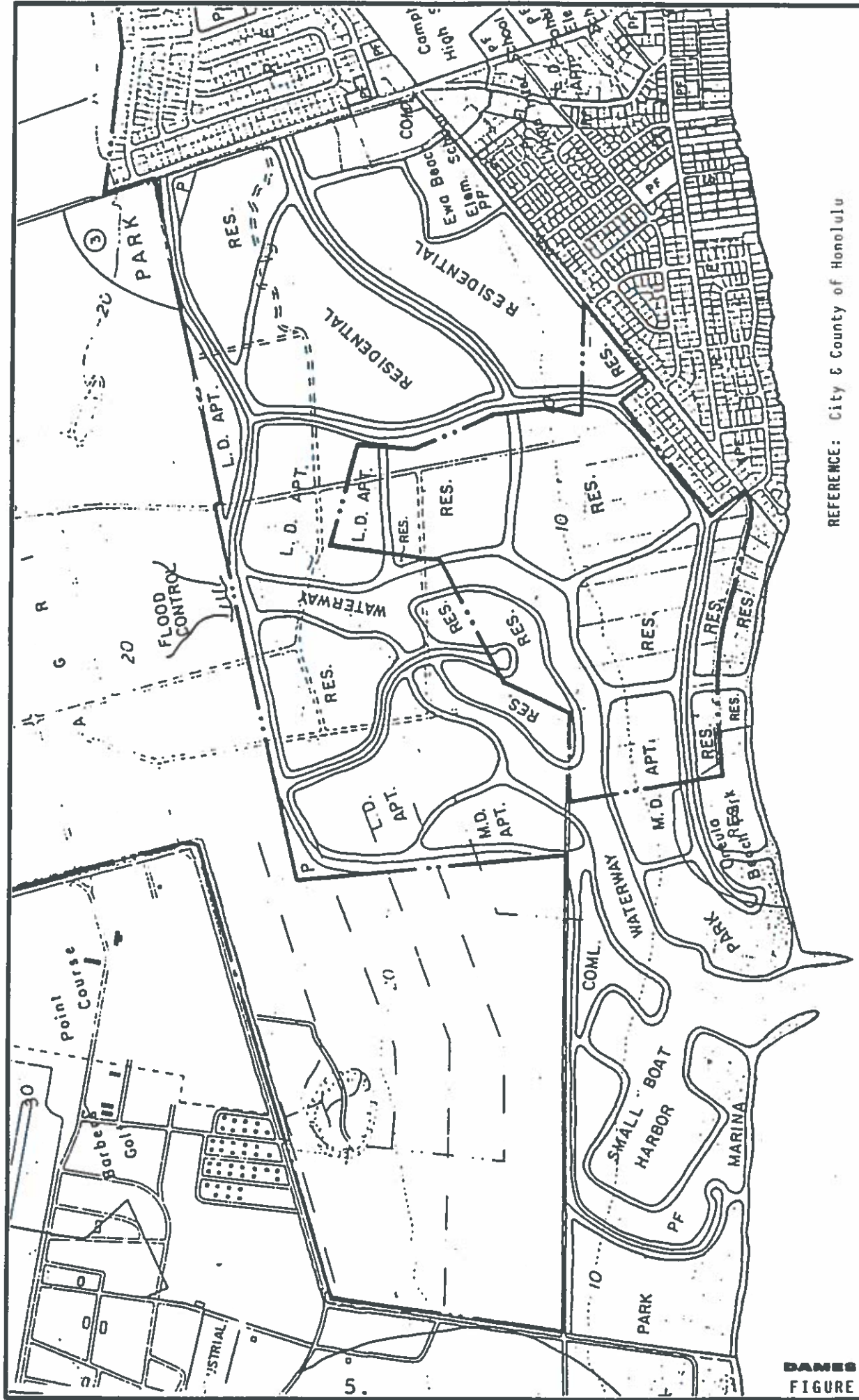
EWA MARINA COMMUNITY, PROJECT SUMMARY  
APRIL 1985



17001 (12-10-85)

BY 1/11 DATE 12-05-85  
CHECKED BY \_\_\_\_\_

REVISIONS  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
FILE 12522-001



REFERENCE: City & County of Honolulu

EWA DEVELOPMENT PLAN  
I AND IISF MAP

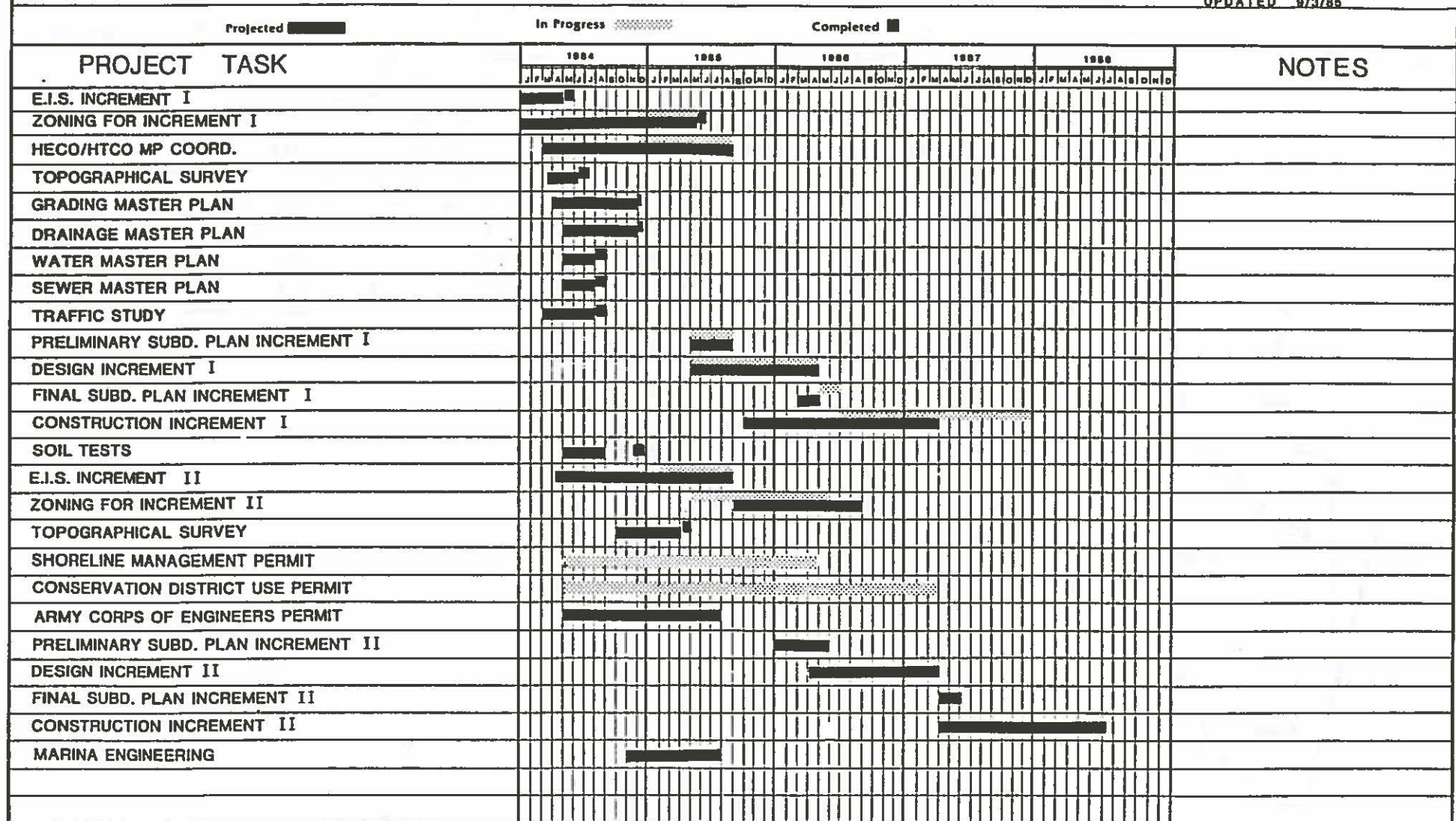
DAMES & MOORE  
FIGURE 4-4

# EWA MARINA

1984 - 1988

Date: 1/15/1984

UPDATED 8/3/85



PROPOSED DEVELOPMENT SCHEDULE



10122-101-101 11 07  
12-05-85

4-8

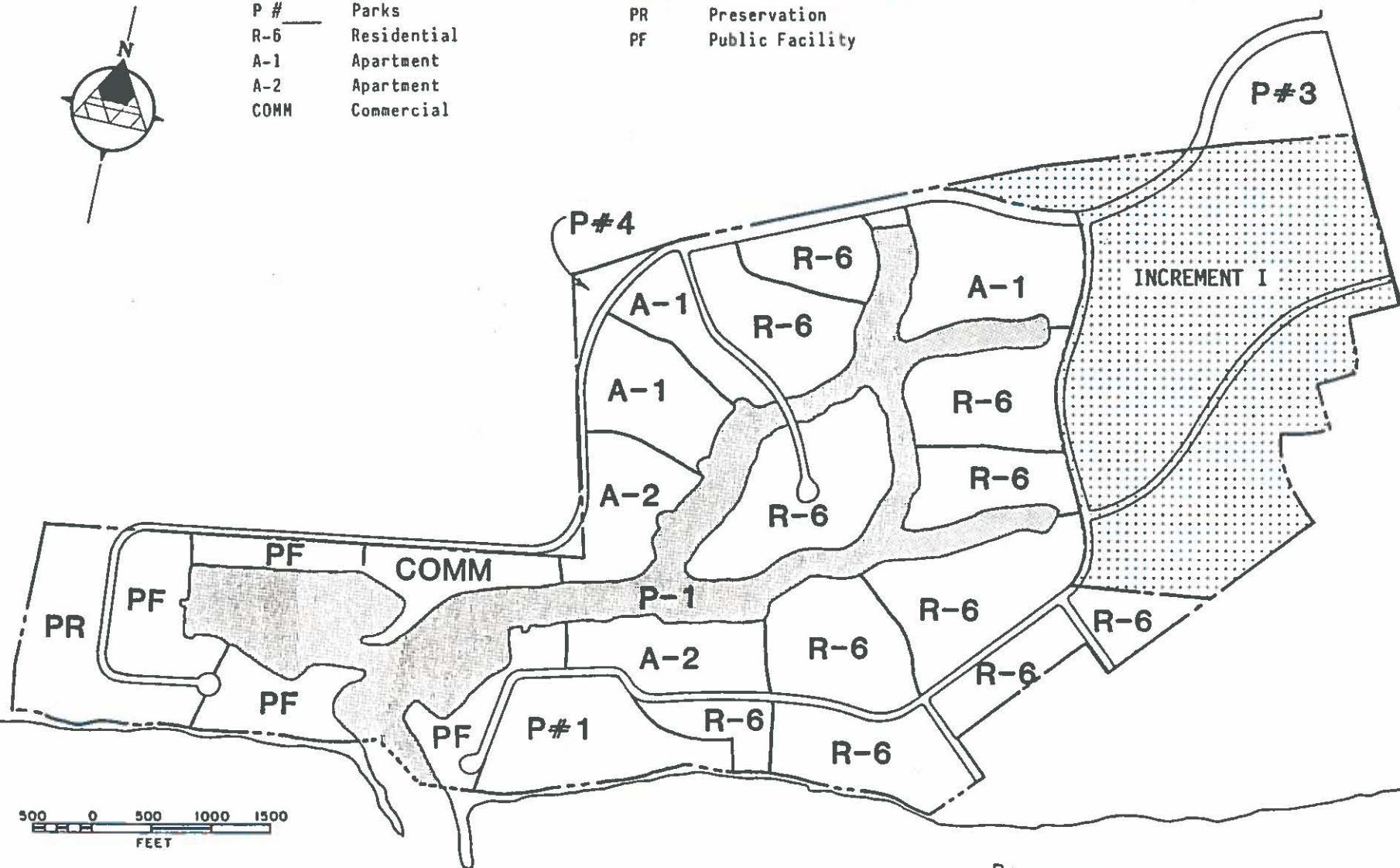


HONOLULU CITY & COUNTY ZONES

- |      |             |
|------|-------------|
| P #  | Parks       |
| R-6  | Residential |
| A-1  | Apartment   |
| A-2  | Apartment   |
| COMM | Commercial  |

SPECIAL DESIGN DISTRICT CODES

- |    |                 |
|----|-----------------|
| PR | Preservation    |
| PF | Public Facility |



**PROPOSED ZONING**

**INCREMENT II - EWA MARINA COMMUNITY**

REFERENCE:

MSM & ASSOCIATES  
EWA MARINA COMMUNITY, PROJECT SUMMARY  
APRIL 1985

DAMES & MOORE  
FIGURE 4-6



## 4.2 PROPOSED MARINA AND WATERWAYS

The marina waterways and protective structures would be constructed, operated and maintained by the applicant independent of the subdivision developers. Approximately 1,600 boat slips would be provided in the mooring areas within the Marina's 115 acres of inland waterways (Figure 4-7). Over 1,000 of the slips would be developed and offered for sale or lease on an equal basis to Ewa Marina residents and to the general public. Those slips circling parcel Z (Figure 4-3) would be reserved for residents only. Boat launching facilities (ramps or hoists) would also be available to residents and the general public on an equal pay-basis. Launching facilities are shown on Figure 4-7. Typical boat slip designs are presented on Figure 4-8. The slips would be either of a floating or fixed design.

The floating design (Figure 4-8A) would comprise of deck floats with foam-filled plastic or concrete floatation components. The floating system would be anchored by guide piles that would be designed to withstand wind and wave loads and berthing forces. Top elevation of guide piles would be determined so that during events of extreme high water elevations the piles would continue to anchor and hold in place the float system. The fixed system (Figure 4-8B) would comprise a pier structure with a concrete deck supported by concrete piles similar to those in the Ala Wai and Waianae harbors on Oahu.

The developer is working out details with the State of Hawaii for establishing land rights for the portions of the marina entrance channel and breakwaters located on or using State lands.

### 4.2.1 Marina Configuration

An artist's rendering of the marina is depicted in Figure 4-9. The Marina waterways are to be excavated into the existing land area. The substrate in this area varies in elevation from 8 to 20 feet above Mean Sea Level (MSL), and is comprised of a 1- to 2-foot layer of imported top soil and about a 1-foot layer of weathered native soil, both of which overlie coral-algal reef rock. The marina walls, depicted in Figure 4-10, should remain stable in most areas that are subject to wave action. In isolated cases where the perimeter is comprised of loose material, the 1:1.5 to 1:2 cut slopes may require revetment protection to stabilize the shoreline. In some areas, large exposed voids on the perimeter would require backfill with excavated coralline material and the backfill would be protected with natural coral rock dredged from the marina. Areas where such treatment is required cannot be determined until construction, due to the variability in subsurface conditions. A wave absorber would be located inside the marina entrance on the western shoreline (see Figure 4-11).

The area around the marina would be graded to convey stormwater, overland flow away from the marina. Drainage channels would be constructed to aid in the conveyance of stormwater away from the marina into greenbelt and landscaped areas that would be used as ponding areas. Other drainage systems from roadways would discharge directly into the marina.



A landscaped walkway or esplanade would be provided around the marina. Where the land elevation is high, a bench would be cut into the side of the marina wall for the esplanade, and would be landscaped. Marina and ocean front setbacks are depicted in Figure 4-12.

Marina depths would vary from 12 feet to 8 feet below MSL with the edges and ends tapering to shallower depths. The proposed depths are shown in Figure 4-11.

#### 4.2.2 Entrance Channel

The proposed entrance channel intersects the shoreline near the present mouth of Kaloi Gulch drainageway. The proposed channel would be 400 feet wide and approximately 2,900 feet long. The optimum channel alignment to allow sailcraft to sail in or out of the entrance on a single tack during trade wind conditions is along azimuth 165°, but to avoid the offshore shallow reef and to minimize impacts on surf sites, the alignment proposed is along the azimuth 169°. Figure 4-13 depicts the proposed entrance channel alignment and configuration. The seaward end of the channel is 20 feet deep over a length of 1,000 feet; the remainder is 15 feet deep, except for the area inside the breakwaters which is 12 feet deep. The greater depth near the entrance is required to reduce the probability of waves breaking in the channel and to allow passage of boats during periods of large swell. The waves would attenuate in height as they propagate up the channel (towards land). The side walls of the entrance channel will be cut on a 1.5 horizontal to 1.0 vertical slope. Typical channel section and profile are shown in Figure 4-14.

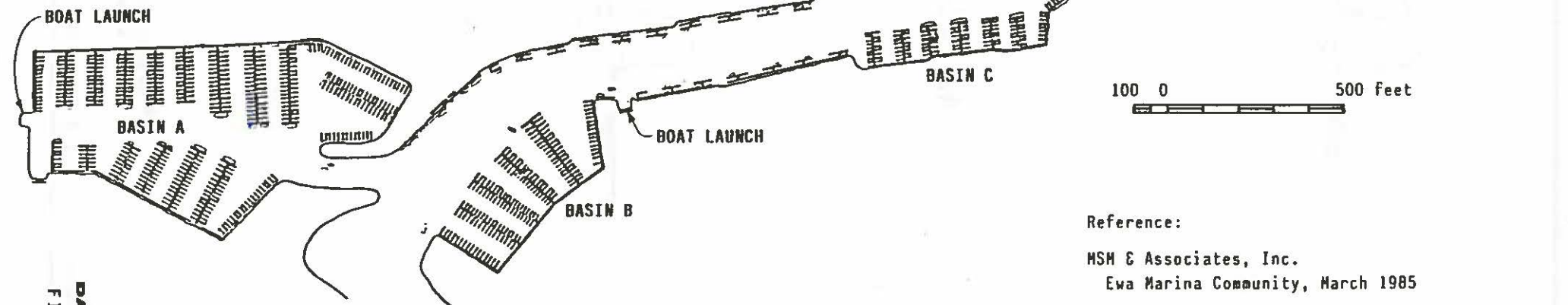
The entrance channel would be marked with navigational aids as shown in Figure 4-13. The navigational aids would conform with U. S. Coast Guard requirements. The proposed navigational aids include two buoys, four beacons, which are aids fixed to the bottom, and a pair of range markers. The buoys would be steel with steel chain and concrete sinkers. Lights would be attached to the buoys. Beacons No. 3 and 4 could be steel or concrete single or multiple-driven piles. Beacons No. 5 and 6 could be steel pipe poles anchored on concrete foundations at the ends of the breakwaters. Flashing green lights would be mounted on odd-numbered beacons or buoys and red light on even numbered beacons or buoys. The height of the buoy lights would be approximately 7 to 10 feet above the water line and the height of the beacon lights will be approximately 18 feet above mean sea level. In addition to the channel markers, a buoy would mark the shoal east of the channel. A pair of lighted range markers, which are not shown on the figure, would be placed inland on the channel centerline within the project property boundary to provide an effective target on which to align. Beacon and buoy lights would be powered by a combination of solar and battery power. The navigational aids are subject to U. S. Coast Guard approval.

Jetties - Rock jetties would be constructed along the entrance channel to protect the marina basin from waves and to prevent littoral drift from shoaling the channel. The jetty would be approximately 500 feet long with a crest elevation of about 6 to 8 feet above Mean Lower Low Water (MLLW). The proposed breakwater locations are shown in Figure 4-13. Detailed wave analyses would be used to determine the final breakwater configuration.

	No. of Boats
Basin A	442
Basin B	183
Basin C	111
Basin D	214
Island	124
Waterways	526
<b>TOTAL</b>	<b>1,600</b>

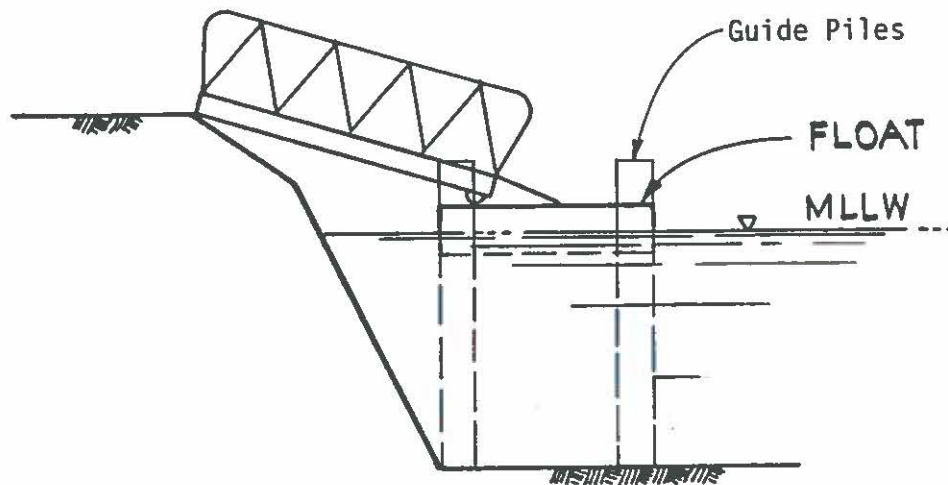
# BOAT SIZE

26'	23
30'	720
35'	490
40'	250
45'	52
50'	30
60'- 100'	35
(end ties)	
<b>TOTAL</b>	<b>1,600</b>



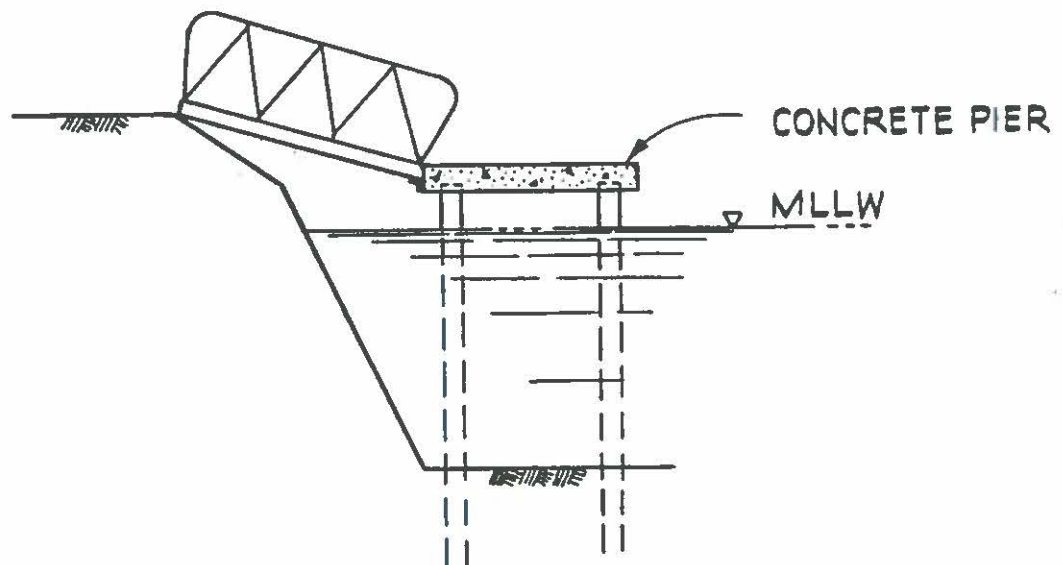
MARINA BOAT SLIP LAYOUT  
EWA MARINA COMMUNITY





### A. FLOATING SYSTEM

NOT TO SCALE



### B. FIXED SYSTEM

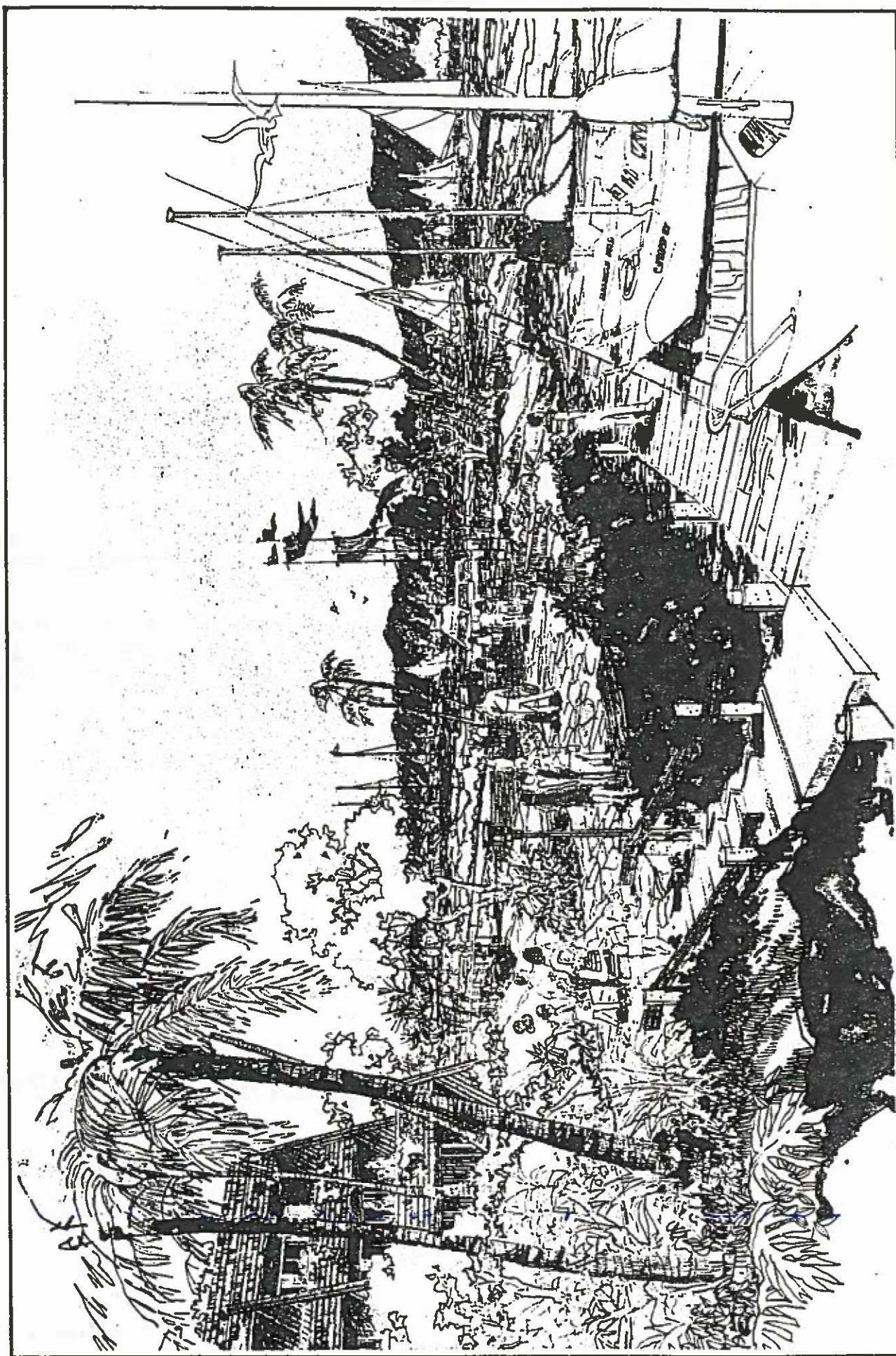
NOT TO SCALE

## TYPICAL SLIP DESIGN

Reference: Moffatt & Nichol, 1985

DAMES & MOORE

FIGURE 4-8



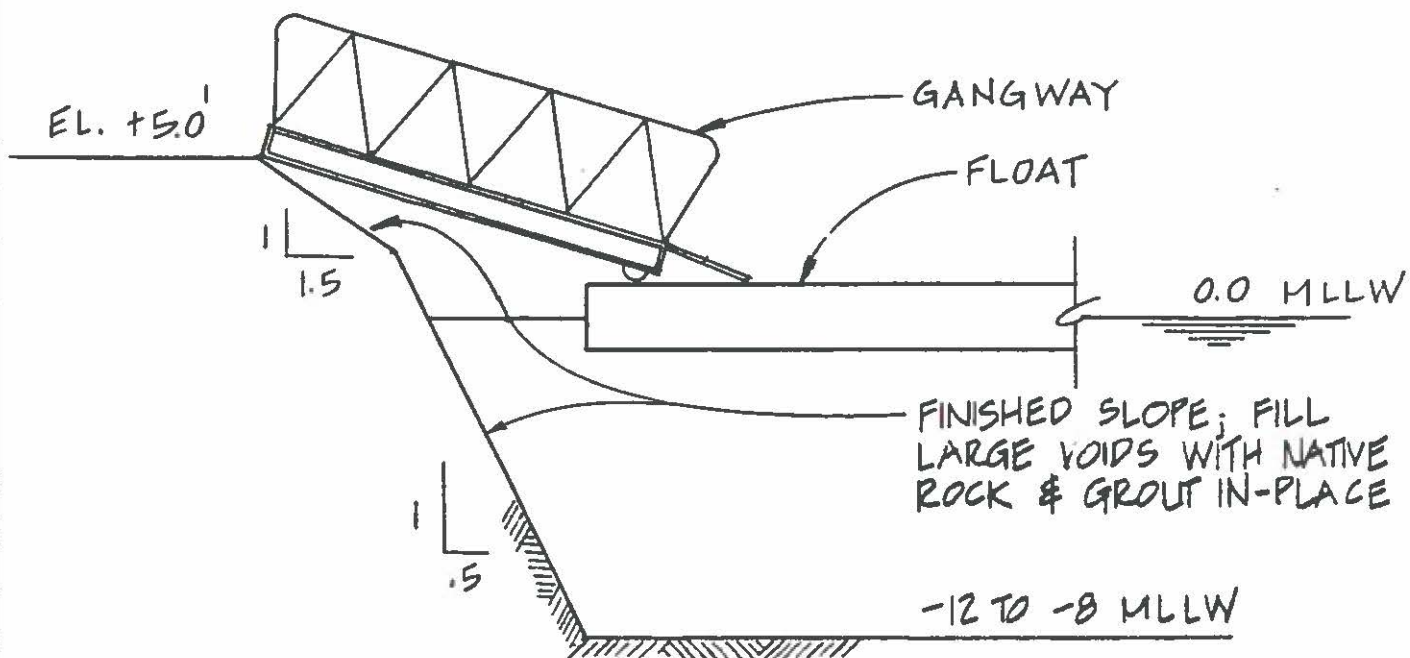
ARTIST'S RENDITION  
TYPICAL MARINA FRONT

Reference: MSM & Associates, 1985

DAMES & MOORE

FIGURE 4-9





## TYPICAL SECTION OF PERIMETER TREATMENT

NO SCALE

Reference: Moffatt & Nichol, 1985

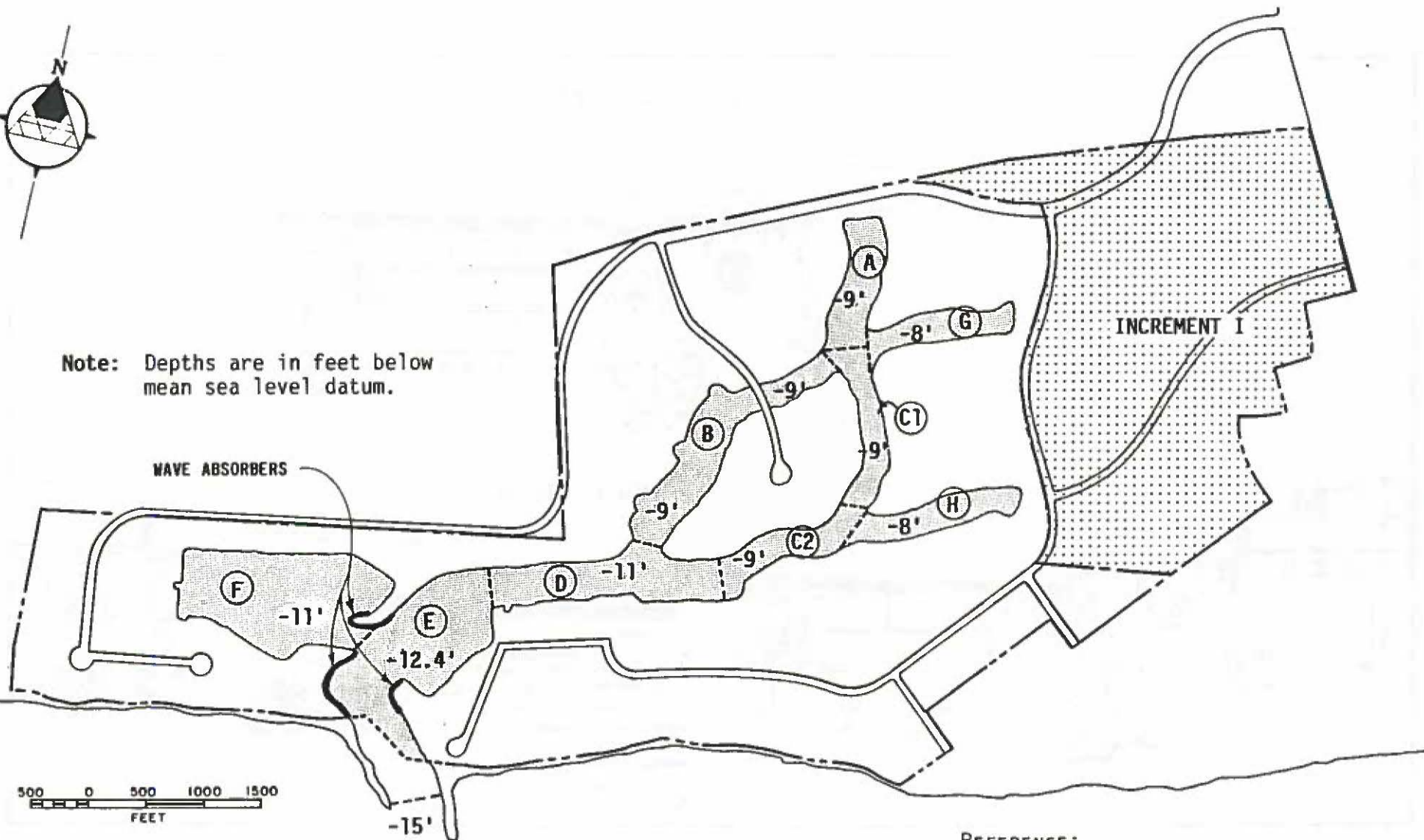
DAMES & MOORE

FIGURE 4-10





Note: Depths are in feet below mean sea level datum.



## MARINA DEPTHS AND DESIGNATIONS

INCREMENT II - EWA MARINA COMMUNITY

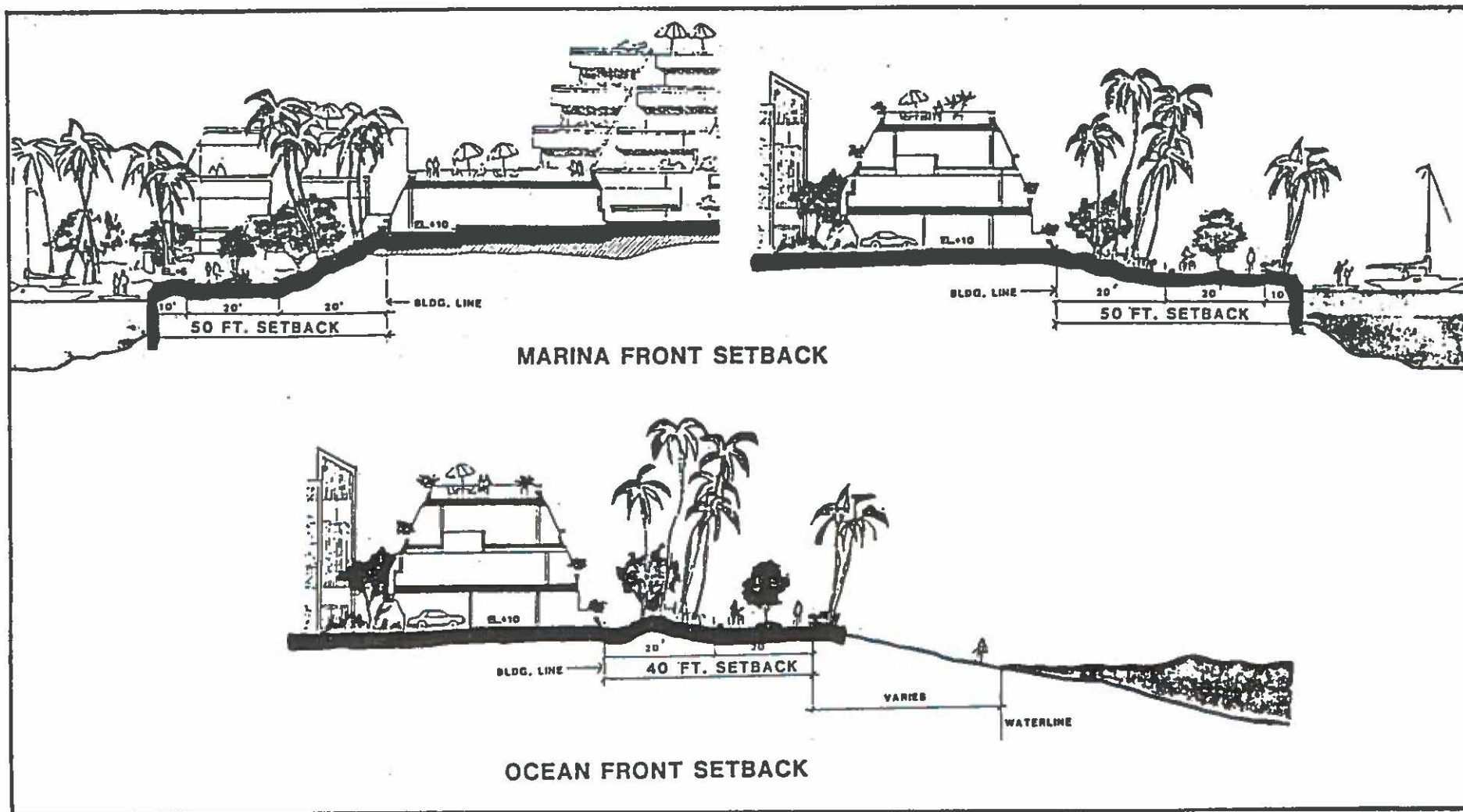
### REFERENCE:

MSM & ASSOCIATES

EWA MARINA COMMUNITY. PROJECT SUMMARY

JANUARY 1981

MOFFATT & NICHOL, 1985



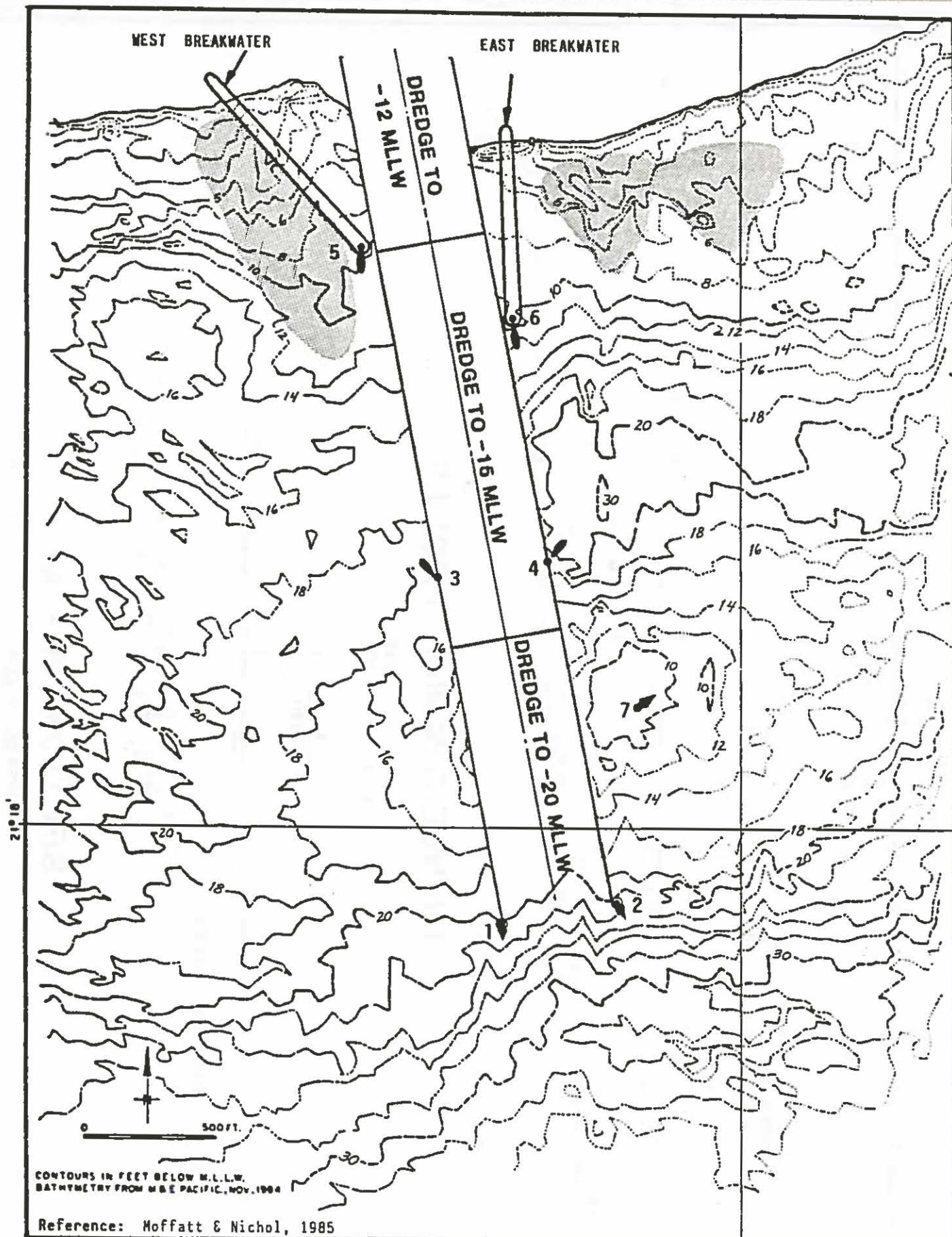
MARINA FRONT SETBACK

OCEAN FRONT SETBACK

MARINA AND OCEAN FRONT SETBACKS

Reference: Pearson and Wuesthoff AIA Architects and Planners; September 1985





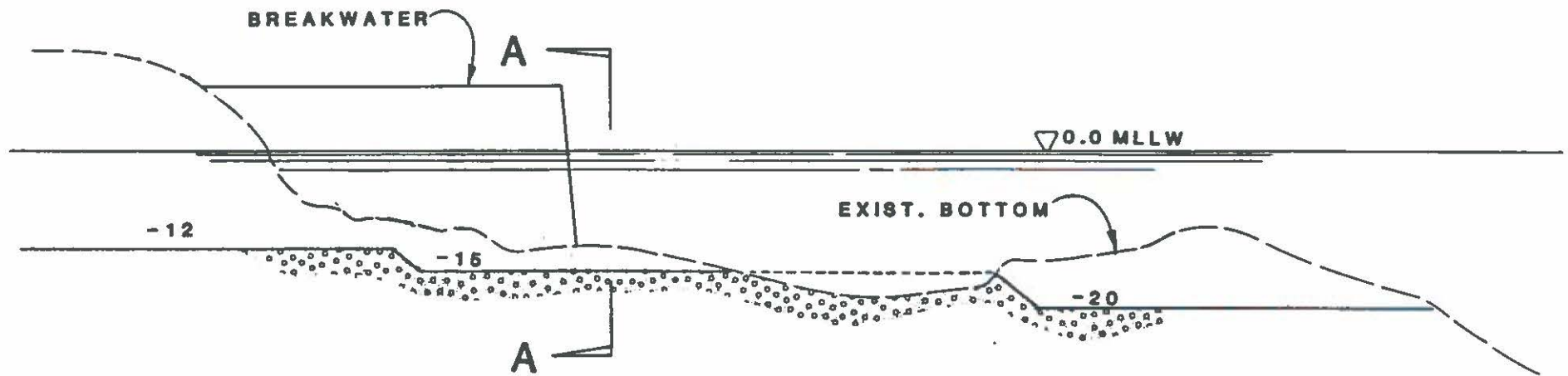
Legend: 1, 2, 7 - Lighted Bouy  
3, 4, 5, 6 - Beacon

Surf Sites

# ENTRANCE CHANNEL CONFIGURATION

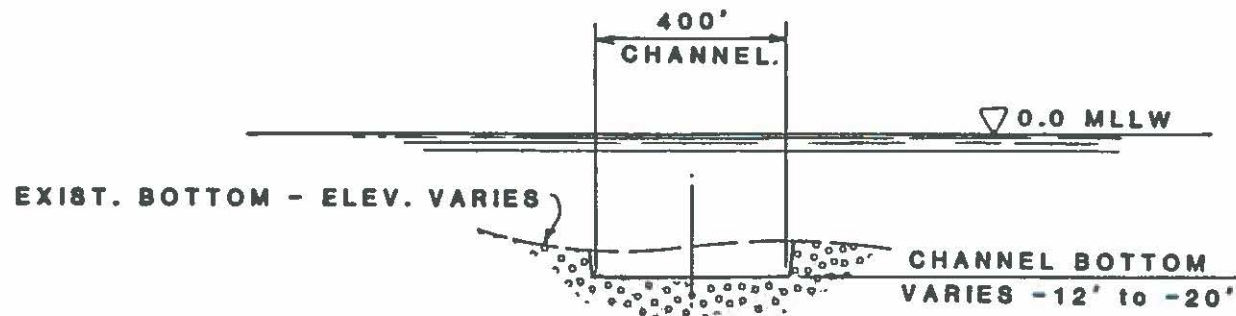
## EWA MARINA COMMUNITY

DAMES & MOORE  
FIGURE 4-13



## ENTRANCE CHANNEL PROFILE

HORIZ. 1" = 400'  
VERT. 1" = 20'



## SECTION A - A

HORIZ. 1" = 400'  
VERT. 1" = 20'



The breakwaters would be constructed of a core of coarse coral, dredged fill, and an underlayer of graduated stones. Armor, quarry stone weighing about 2 to 4 tons would be placed over the underlayer to protect the breakwater from waves. A typical cross section is shown in Figure 4-15. The breakwater would rest on coralline substrate, not sand. The coral material would adequately support the structures without a filter or keying of the structure into the coral.

Surfing Sites - The channel and breakwaters would cross through a surfing site identified in a survey by the Department of Land and Natural Resources (undated). This would essentially destroy the surf site (see Figure 4-13).

Littoral Drift - The breakwaters would act similar to groins along the beach. The eastern breakwater would trap sand transported offshore or westward around the rocky headland, enlarging Oneula Beach Park beach. The channel would intercept sand directed offshore around the head of the breakwater. The sand trapped in the channel probably does not contribute significantly to Nimitz beach, and therefore erosion of Nimitz Beach due to entrapped sand would not occur. However, if erosion occurs on the downdrift side (at Nimitz beach), the applicant would nourish the beach with similar beach sand, and by-pass sand around the breakwater and channel. It should be noted that sand "mining" is not presently under State law.

Historic Sites - The marine excavation and site grading and development using the material excavated from the marina would essentially destroy any archaeological or paleontological sites located on the property. The applicant is presently working with the State Historic Preservation Officer to develop a satisfactory mitigation plan.

#### 4.2.3 Marina Construction Procedures

The first step in marina construction would be grubbing and clearing of accumulated trash on the project site. This material will be hauled to an off-site sanitary disposal area.

As a second step, approximately 3,200,000 cubic yards of material above MSL would be excavated from within the marina alignment by bulldozers, scrapers, and backhoes. This material would be stockpiled on the project site for use as fill on the property.

Approximately 1,700,000 cubic yards of material below MSL then would be excavated by dragline and large backhoe. This material also will be retained for use as fill on the property. Isolated hard rock formations probably would require blasting to break the rock for easy removal. The marina basin would be excavated prior to opening the marina to the sea so that suspended sediments would be confined to the excavation site and reduce turbidity in near-shore waters. The marina basin would take approximately 1 to 2 years to excavate.

Concurrent with the later stages of marina excavation, approximately 147,000 cubic yards of material offshore would be removed with a cutter-head, hydraulic pipeline dredge or backhoe and clamshell dredge to create the marina entrance channel. Some blasting could be required to excavate the entrance channel in which case a blast program will be implemented to assure that



blasting will not damage nearby existing structures. Blasting would be limited to those periods specified by the National Marine Fisheries Service to minimize impacts to endangered marine mammals and threatened sea turtles. In addition, the blast area would be searched prior to blasting for the endangered marine mammals and threatened sea turtles. Blasting would not be done if these animals are in the blast area. The entrance channel would take about 6 months to dredge. Dredged material would be removed from the entrance channel and placed on dry land, in a diked, disposal area located on the Ewa Marina community property. Return water, if any, would percolate into the substrate, or be retained in the dike prior to discharge into the marina. Dredged material would not be redeposited in shallow water and rehandled prior to land disposal.

Some of the dredged material would be placed on the proposed residential and commercial areas located within the Special Management Area and Shoreline Setback Area. The exact quantities will be determined during final grading plan development. The dredged material also would be used for core material in the breakwater construction. Dredged material alternatively would be disposed at sea in the approved ocean disposal site shown in Figure 4-16.

The breakwaters would be constructed following the entrance channel construction. Maintenance of the breakwater and entrance channel to continue their protective function in a safe manner would be the responsibility of the developer.

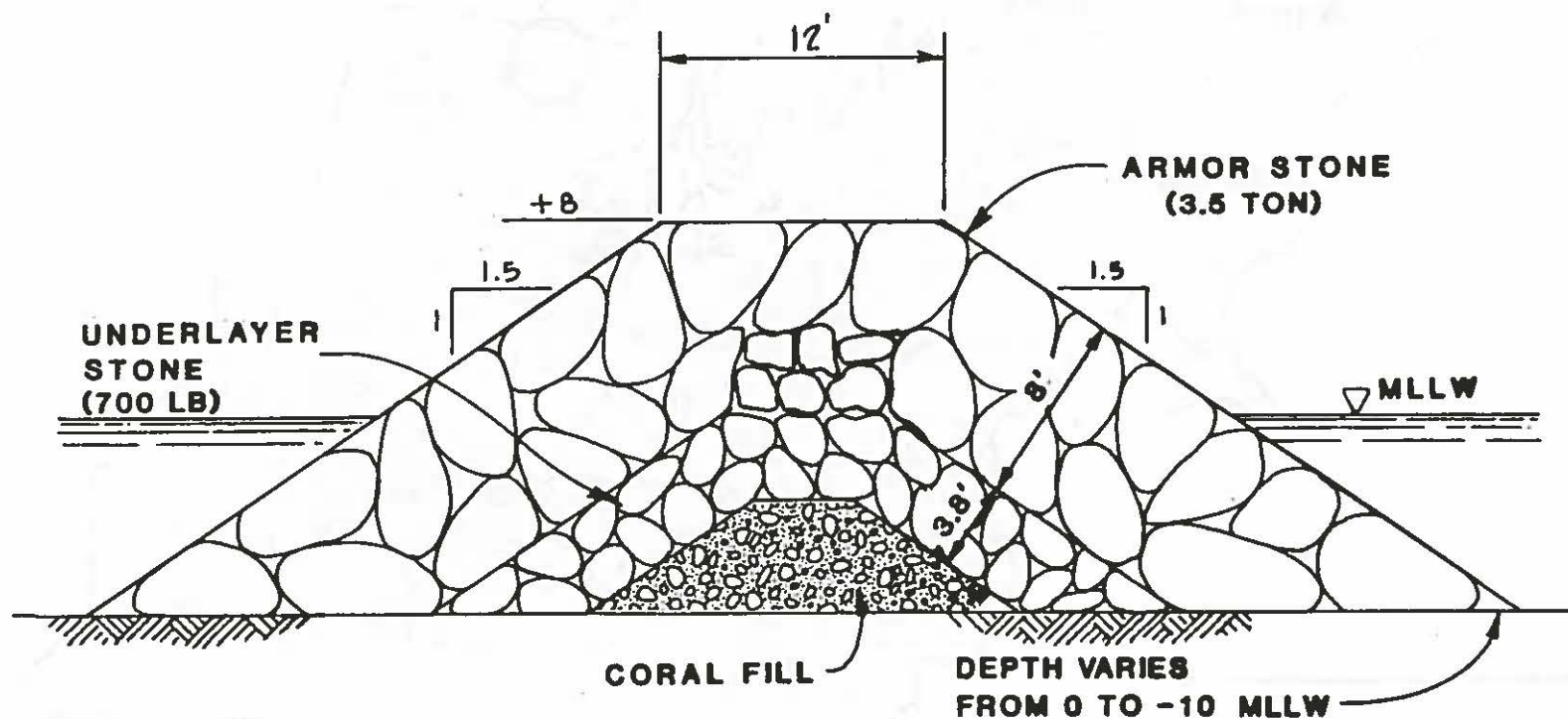
#### 4.2.4 Drainage Into Marina

In accordance with the Honolulu County storm drainage design procedure, the 100-year storm runoff from the Kalo Stream watershed could be as much as 13,000 cubic feet per second (cfs) at the mauka boundary of the Ewa Marina Project. With the planned 125-acre flood control ponding basin north of Increment II, the maximum discharge into the project site would be reduced to about 10,000 cfs.

Flood flows will produce an ebb current in the marina channels, which must be considered in the design of slips and moorings. In 300-foot-wide channels having a depth of 8 feet, the velocity would be 2.5 knots. The corresponding drag forces on boats and submerged portions of the slips would have to be countered by the lateral resistance of guide piles or anchors. To accommodate these off-site flows, the Marina would be designed to convey the storm runoff to the sea, without any adverse water level rise in the marina.

Within the terrestrial development, a drainage system would be constructed to handle the runoff flows. Greenbelts and landscaped areas would be utilized as ponding areas to slow or retain storm water. The ponding areas would reduce storm flow into the marina and would allow sediment precipitation and storm water percolation within the ponding areas. Ponding basins and dry wells would be used to increase storm water percolation and decrease flows into the marina. The storm drainage system in public roads and easements to be dedicated to the City would be designed in accordance with City and County design standards and approved by the City and County. The drainage system would consist of a network of storm culverts and open channels to direct the storm water to the marina. The design details of the impact-type energy dissipation structures that will be used where storm drains enter the marina are shown in Figure 4-17.

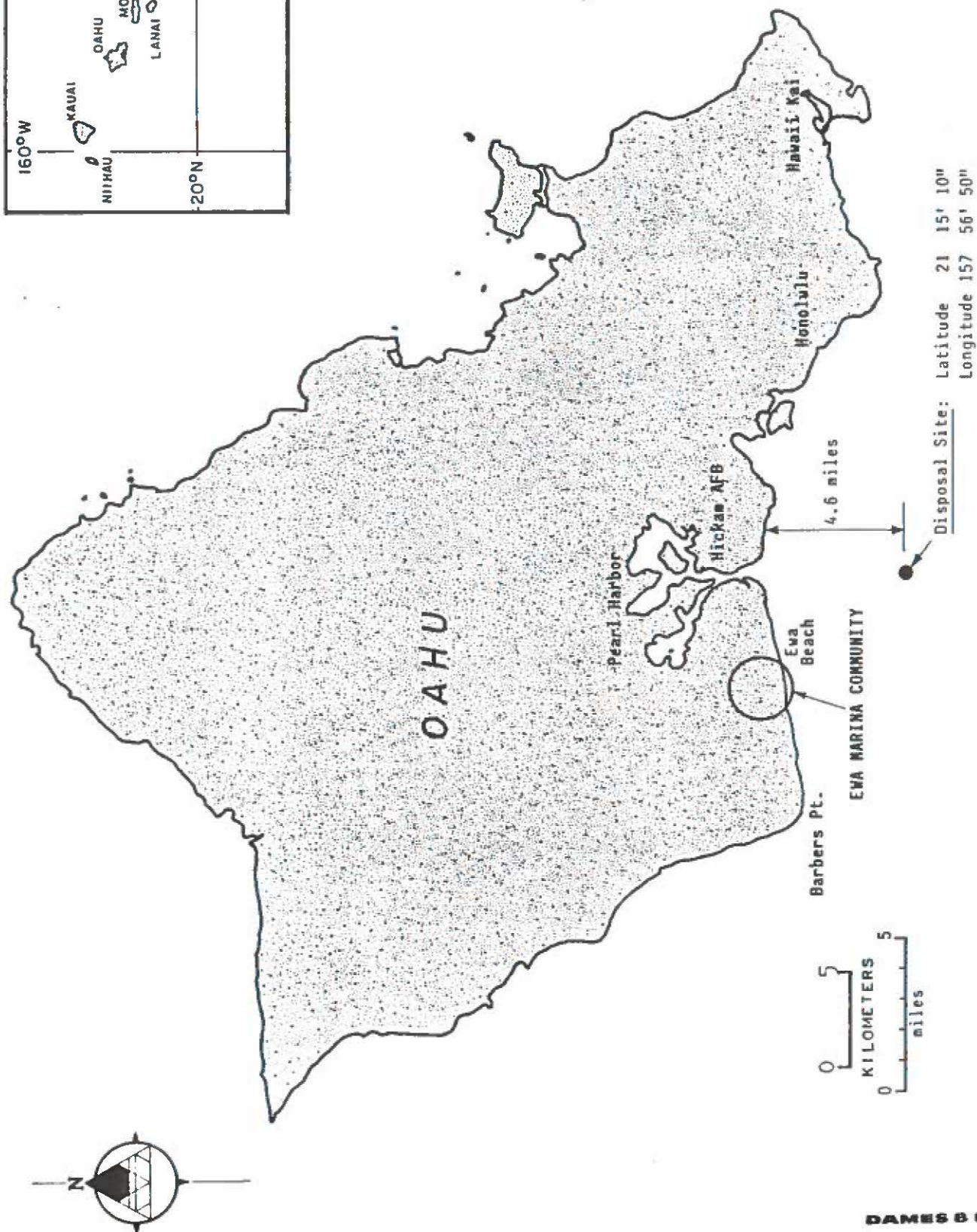
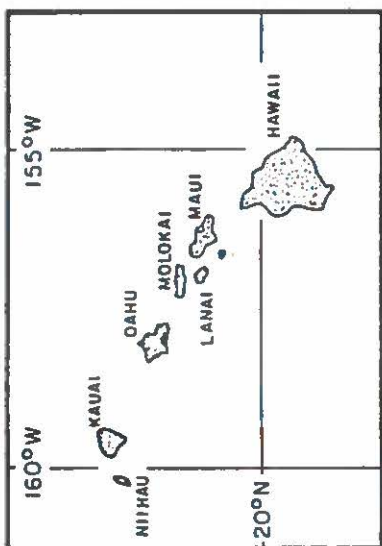




TYPICAL BREAKWATER SECTION  
INCREMENT II - EWA MARINA COMMUNITY

Reference: Moffatt & Nichol, 1985

13432-001 01 3-22-85



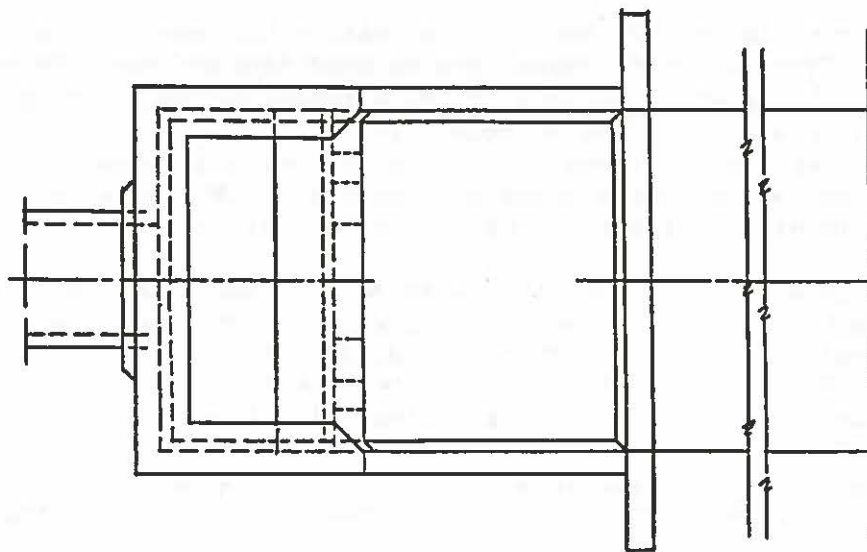
# EXISTING OCEAN DISPOSAL SITE

Reference: W & E Pacific, 1985

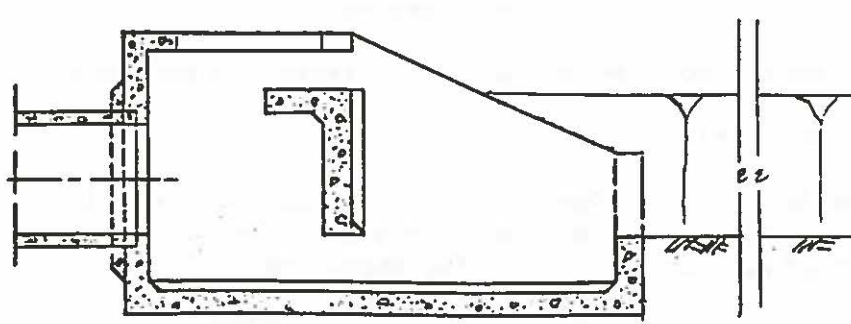
DAMES & MOORE

FIGURE 4-16





PLAN



SECTION

NOT TO SCALE

## TYPICAL STORM DRAINAGE STRUCTURE

### IMPACT-TYPE ENERGY DISSIPATOR

Reference: M & E Pacific, 1985

DAMES & MOORE

FIGURE 4-17

#### 4.2.5 Marina Flushing

Water circulation for the proposed marina has been analyzed by the marina designer. Circulation currents, due to wind blowing over the water surface, have been calculated. Portions of the waterway system aligned with the prevailing tradewinds would be considered as perfectly mixed. Tidal flows would transfer water between adjacent mixed cells (channels). The marina configuration and flushing times are depicted in Figure 4-18 and the principal physical dimensions of the channel areas in Table 4-1.

Channels B, C1, C2, and D are aligned with the wind. The calculated flow in this section, due to a longitudinal wind component of 7 knots, is about 100 cfs, and the time for a complete passage of water down the surface of the channels and back along the bottom is less than 2 days. Channel A is north-south oriented and has little tidal flow into it. For practical purposes, Channels B, C1, C2, and D may be considered as a single well-mixed basin placed between Channels E and A. Channels G and H are perpendicular to the wind and exhibit less mixing and correspondingly longer residence time.

Tidal flows were computed on the basis of one 2-foot tide per day. Exchange flows were computed as the tidal prism volume passing from one basin to another and converted to cubic feet per second. The numerical data leads directly to calculated residence times throughout the system. The mean residence time is defined as the expected time for a particle of water, initially positioned at some location, to reach the open ocean. Results are given in Table 4-1. The longest residence time (Channel H) is 12.1 days. Residence times for Hawaii Kai, a similar community, have been reported to be in the order of 30 days, and water quality within Hawaii Kai historically has been considered "acceptable". Therefore water quality within the proposed marina is also anticipated to be acceptable.

Marina design considerations are presented in Appendix B.

#### 4.2.6 Public Access

The marina entrance channel would interrupt the nearly 8,000-foot shoreline, cutting the shoreline into two segments. This effectively interrupts public movement along the shoreline.

Public access to the Marina would be provided by a nearly continuous landscaped esplanade around the perimeter of the Marina (Figure 4-9 and 4-12). Public access also would be provided to the beach front via the community greenbelt system and to the Oneula Beach Park via Papipi road. The greenbelt system would consist of pedestrian and bicycle pathways. (See Figures 4-2 and 4-19). Public access to the esplanade Greenbelt system and beach would be unrestricted. The Greenbelt system and public access is shown on Figure 4-19. Public parking would be allowed in conformance with City and County of Honolulu parking regulations. Parking in the commercial areas would be governed by normal commercial practices. Public boating access to the marina would not be restricted, but boat operators must comply with marina boating rules.



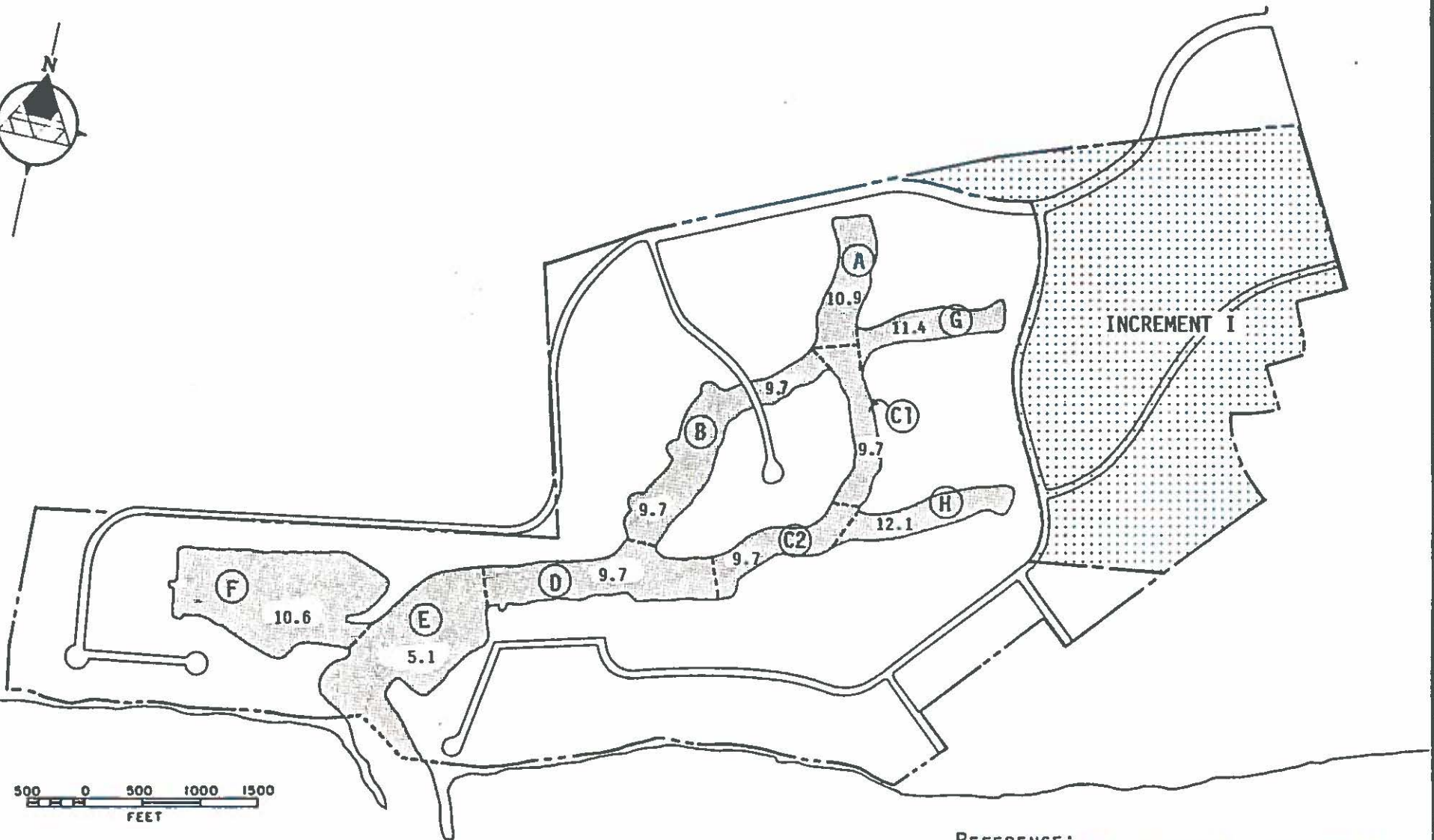
TABLE 4-1

CHANNEL CHARACTERISTICS

Channel	Length ft	Width ft	Depth ft (MSL)	Surface AC	Volume AF
A	1,100	300	9	7.6	68.4
B			9	18.5	166.5
C1			9	7.5	67.5
C2			9	12.4	111.6
D			11	8.3	91.3
E			12.4	22.2	275.3
F			11	26.2	288.2
G	1,340	185	8	5.7	45.6
H	1,580	180	8	6.5	52.0
				114.9	1,166.4

CALCULATED RESIDENCE TIMES

Point	Residence Time, Days
Channel E	5.1
Basin F	10.6
Channels B, C, D	9.7
Head Channel A	10.9
Channel G	11.4
Channel H	12.1



REFERENCE:  
MSM & ASSOCIATES  
EWA MARINA COMMUNITY, PROJECT SUMMARY  
JANUARY 1984  
MOFFATT & NICHOL, 1985

CALCULATED RESIDENCE TIMES (DAYS)  
INCREMENT II - EWA MARINA COMMUNITY





LEGEND:

— Pedestrian Circulation System

Flood Control Basin

INCREMENT I

Oneula  
Beach Park

500 0 500 1000 1500  
FEET

Reference:

MSM & Associates

Ewa Marina Community, November 1984

Moffatt & Nichol, 1985

PROPOSED GREENBELT CIRCULATION

EWA MARINA COMMUNITY

DAMES & MOORE  
FIGURE 4-19

4-27

#### 4.2.7 Marina Maintenance

The applicant is responsible for maintaining the marina breakwater and channels. Silt entering the marina with storm flows would shoal the marina. The applicant estimates that 900 tons, or 600 cubic yards of silt would accumulate in the marina per year. Maintenance dredging in the marina would be performed every five years removing an estimated 3,000 cubic yards of silt. The applicants expect to use a suction dredge, placing the dredged material in a temporary diked retention basin prior to allowing the effluent to return to the marina channels. Experience in Hawaii Kai Marina suggests that shoaling would be significant where drainageways empty into the marina.

Periodic maintenance dredging would be required to remove sand from the entrance channel. The sand would be removed from the channel and placed on the down-drift side of the channel. As the channel may interrupt littoral drift, the applicants may be required by the Corps of Engineers to periodically survey beach profiles on both sides of the entrance channel to detect any unnatural erosion at the Oneula and Barbers Point NAS beaches, and to take the necessary corrective actions to reduce adverse effects.

#### 4.3 RESIDENTIAL

Of the 565.7 acres in the Increment II development, 307.5 acres are allocated for residential use, including the pad areas and open space. This acreage is projected to support a total of 3,578 units, subdivided into 16 residential development areas I through Z as delineated in Figure 4-3. The average density would be about 12 units per acre.

A range of residential unit types would be provided to achieve maximum market penetration through a variety of housing offerings by different builders. Anticipated unit densities range from a low of 5 units per acre to a maximum of 33 units per acre. Generally, the higher densities are concentrated in areas offering the greatest locational and visual amenities, such as on the marina. The highest value residential units would be in parcels R and S which front the ocean and parcel Z, the marina island.

As the land developer, M.S.M. would not have direct control over residential unit prices constructed by others. Nevertheless, the market studies performed for the property in 1983 suggest that the majority of units should be priced within the \$100,000 to \$200,000 range, with lower density units along the marina waterway and on ocean frontage commanding prices in the \$200,000 to \$400,000 range (1983 dollars).

A total of 10 percent of the residential program or 485 units of the entire project (Increments I and II) would be allocated for "affordable" housing. Pricing of these units would depend upon the government criteria established for this type of housing.

The details of residential development are to be established during the design of the project, in collaboration with City and County planners and public housing agencies. This would include specific use and density precincts for residential, commercial, and park uses, as well as design criteria for major project elements.



Automobile Allotment - An automobile allotment of 1.8 vehicles per dwelling unit has been developed based upon similar residential areas in Hawaii (P.R.G. Voorhees, 1980). This would result in an estimated 6,440 automobiles owned by the residents of Increment II.

Costs - Developer costs, in millions of dollars for the proposed Increment II project, are summarized as follows:

General Development	\$ 65.0	
Infrastructure	42.0	
Amenities	17.0	
Residential	485.0	
Commercial	15.0	
	<u>624.0</u>	(1984 Dollars)
TOTAL		

#### 4.4 COMMERCIAL

Commercial development would occur at the Ewa Marina Village Center (Parcels 2, 3, 4, 5, 7 on Figure 4-3).

Ewa Marina Village would serve as the focal point of the Ewa Marina Community. Situated in the center of the community at the head of the main channel entrance, the center should provide for a variety of commercial activities -- convenience/community shopping, professional office accommodations, community services, and waterfront activities. The proposed center would accommodate 100,000 square feet of retail commercial space and 40,000 square feet of offices and community services. The Ewa Marina Village also would feature 500 boat slips. The market area for the proposed Ewa Marina Village Center should be primarily the communities of Ewa Marina, Ewa Town, Ewa Beach, and Barber's Point. Its effective market radius would be from 3 to 5 miles, with limited additional support from Oahu's residents and visitors attracted to the marina and its boating activities.

Commercial fishing support for about 200 berths also would be provided within the marina fronting the commercial area.

#### 4.5 PARKS AND PRESERVES

About 20.3 acres of parks are to be included in the Ewa Marina Community Increment II project (Figure 4-3). This is in addition to the existing 30-acre Oneula Beach Park, the continuous waterfront esplanade connecting pedestrian greenbelts and the public beach. The 20.3 acres to be developed in parks are to be dedicated to the public system and designed in accordance with City and County of Honolulu requirements.

The 27.5 acre preservation area (Figure 4-3) has been designated to maintain the area in its present undeveloped condition. However, public access over existing unimproved trails would continue. Automobile use in the area would be prohibited.

#### 4.6 INFRASTRUCTURE

##### 4.6.1 Sewerage

A Sewer Master Plan for the over all project has been developed which identifies anticipated quantities per area. Increment II, as defined on the Sewer Master Plan, would generate the following quantities:

<u>Area</u>	<u>Residential Units</u>	<u>Average Sewage Quantity</u> <u>(million gallons/day)</u>
2		0.153
3		0.090
4		0.196
5		0.161
7		0.127
I	95	0.030
K	391	0.125
L	236	0.076
M	228	0.073
N	133	0.043
P	143	0.046
Q	614	0.138
R	92	0.029
S	217	0.069
T	60	0.019
U	82	0.026
V	146	0.047
W	121	0.039
X	278	0.089
Y	552	0.124
Z	190	0.061
<u>TOTAL</u>	<u>3,578</u>	<u>1.761</u>

Source: Park Engineering, September 1985

The City's Honouliuli Wastewater Treatment Plant (WWTP) has an existing capacity of 25 million gallons per day (mgd) and would have an ultimate capacity of 51 mgd. Of this flow capacity, 11 mgd have been projected to accommodate future development between Makakilo and Halawa. Present average daily flow at the plant is 17 mgd (personal communication, operations personnel, Honouliuli WWTP, December 1985).

The Increment II sewer collection system would be a gravity collection system serving all residential, commercial, and recreational needs, with sewage to be pumped in a force main to the Honouliuli Sewage Treatment Plant. Sewage which cannot be accommodated in the existing Ewa Beach force main, which is located in the Fort Weaver Road right-of-way, would be carried in new force mains constructed by the project developer. The collection system and force mains would be designed and constructed according to City and County standards and dedicated to the public system. The location of these force mains are depicted in Figure 4-20.

The portion of the sewer outfall from the Honouliuli waste water treatment plant that passes beneath the proposed marina would be replaced with a siphon outfall so that the outfall can be placed beneath the bottom of the marina.



The siphon would be designed and constructed to City and County of Honolulu Department of Public Works standards and approved by them. The siphon would be constructed at the developer's expense, prior to excavations of the marina. The 10-inch sewerline crossing in the marina would also be constructed prior to the marina construction.

#### 4.6.2 Water Supply

Potable water would be delivered to the site and transmitted to users in accordance with BWS standards at the expense of the landowner and/or the developer. A water system master plan has been developed by the landowner and approved by the BWS.

The proposed project is within the DLNR Pearl Harbor Groundwater Control Area. The DLNR thus has jurisdiction over the allocation of groundwater resources within the project area.

Because of the potential shortage of potable water, projected potable water requirements for the total proposed development would be reduced substantially through the use of a dual water system. In contrast to single systems that provide only potable water, dual systems distribute two grades of water, potable and non-potable. Dual water system plans would be established in accordance with existing (and yet to be determined) regulations, statutes, procedures, and policies established by the Honolulu Board of Water Supply.

The potable water would be provided for domestic use. The required potable water can be made available through one or a combination of the following means:

- a. The capture of Waiau Spring Water. The HECO Waiau spring presently leaks approximately 5 to 8 mgd of potable water into Pearl Harbor. The Board of Water Supply was providing the means to capture this water and make it available to help meet Ewa's future potable demand; however, development of the Waiau Springs project has been deferred.
- b. The 22.5 mgd reduction in consumption by Oahu Sugar Company could be re-allocated by DLNR to the BWS or directly to other users within the Ewa Plain. This could result in additional potable water being provided to the Ewa Marina Community. On July 11, 1985, the Board of Land and Natural Resources did, in fact, reallocate 11.81 mgd from the Pearl Harbor Ground Water Control Area to the BWS for distribution among various Ewa/Pearl Harbor developments including the Ewa Marina Community. The BWS was allocated a permitted use of 2.0 mgd to drill new wells at Honouliuli. The source will be used for the Ewa Plain developments. The BWS is presently working with Campbell Estate to drill additional wells in the Honouliuli area for the proposed development.
- c. The reduction in export to the Waianae-Makaha area as wells are developed at Makaha and Waianae. The Board plans to develop wells both at Makaha and Waianae with a total potential yield of 6.0 mgd. If successful, the development of wells would allow the Board to reduce export to these areas. The Board has indicated that excess water from the Pearl Harbor District which is not needed for the Waianae-Makaha area will be available for the project.

Potable water requirements for Increment II of the proposed Ewa Marina Community are presented in Table 4-2.

LEGEND:

- ..... PROPOSED SEWER MAIN
- PROPOSED FORCE MAIN



PROPOSED PUMP  
STATION NO. 1

PROPOSED PUMP  
STATION NO. 2

TO HONOLULU WASTEWATER  
TREATMENT PLANT

EXISTING DRAINAGE  
CHANNEL

Flood Control Basin

INCREMENT I

Siphon

to City interceptor



REFERENCE:

MSM & ASSOCIATES  
EWA MARINA COMMUNITY, PROJECT SUMMARY  
JANUARY 1984

PROPOSED SEWAGE COLLECTION SYSTEM

INCREMENT II - EWA MARINA COMMUNITY



TABLE 4-2

EWA MARINA COMMUNITY  
WATER MASTER PLAN  
PROJECTED POTABLE WATER DEMAND

PARCEL	TYPE	No. of UNITS	FLOW/UNIT (GPD)	AVERAGE FLOW (MGD)	MAXIMUM FLOW (MGD)	PEAK FLOW (MGD)
I	MD	95	331	0.03	0.05	0.10
K	LD	391	331	0.13	0.20	0.40
L	SF	236	500	0.12	0.18	0.36
M	SF	228	500	0.11	0.17	0.34
N	SF	133	500	0.07	0.10	0.20
P	SF	143	500	0.07	0.11	0.22
Q	MD	614	331	0.20	0.30	0.60
R	SF	92	500	0.05	0.07	0.14
S	SF	217	500	0.11	0.16	0.32
T	SF	60	500	0.03	0.04	0.08
U	SF	82	500	0.04	0.06	0.12
V	SF	146	500	0.07	0.11	0.22
W	LD	121	331	0.04	0.06	0.12
X	LD	278	331	0.09	0.14	0.28
Y	MD	579	331	0.19	0.29	0.58
2	SF	190	500	0.10	0.14	0.28
2	COMM	13.7 AC	2160	0.03	0.04	0.08
3	COMM	8 AC	2160	0.02	0.03	0.06
4	COMM	17.5 AC	2160	0.04	0.06	0.12
5	COMM	14.4 AC	2160	0.03	0.05	0.10
6	PRESERV.	27.5 AC	720	0.02	0.03	0.06
7	COMM	11.3 AC	2160	0.02	0.04	0.08
P-1	PARK	30 AC	720	0.02	0.03	0.06
P-3	PARK	15.6 AC	720	0.01	0.02	0.04
P-4	PARK	4.5 AC	720	0.003	0.005	0.01
	BOATS	1600	50	0.08	0.12	0.24
TOTAL				1.723	2.605	5.21

Source: M & E Pacific, Inc.

Non-potable water would be provided for non-domestic uses such as landscaping. The non-potable water used in Increment II will have higher salinity and total dissolved solids but will not otherwise have adverse health effects. The non-potable water will be provided for irrigation and non-domestic use. Non-potable water will provide about 21 percent of the total water demand for Increment II. Non-potable water demands are presented in Table 4-3 and locations of the proposed non-potable wells are presented in Figure 4-21.

Non-potable water sources would be developed by either the land owner or the developer in conformance with DLNR and BWS criteria.

#### 4.6.3 Drainage

Drainage is to include development of on-site drainage, roadway curb and gutter, inlet piping and outfall structures to the internal waterway system. Designed improvements include on-site ponding of stormwater in open spaces and upstream settling basins designed for 100-year storm flows from Kaloi Gulch with urbanization to the north (mauka) of the project. These improvements will reduce turbidity in stormwater input to the marina waters and will be designed in accordance with City and County Standards. They will be dedicated to the public system, and provided by the developer. Drainage design details were provided in the Programmatic EIS.

#### 4.6.4 Roadways and Access

Roadways are to be designed and constructed by the developer in accordance with City and County standards, and, where applicable, with State standards, for dedication to the public system.

Internal Circulation. Traffic circulation within Increment II of the proposed Ewa Marina Community would be within the main roadways provided by the developers (see Figure 4-3). Additional circulation and access to residences would be provided within each parcel by the individual subdeveloper. This is illustrated in Figure 4-2.

Traffic. Based upon previous traffic studies for the proposed Ewa Marina Community, the following traffic generation rates were estimated for Increment II:

Daily		21,411 trips/day
AM Peak	- In -	351 trips/hour
	- Out -	1,404 trips/hour
PM Peak	- In -	1,404 trips/hour
	- Out -	702 trips/hour

The geographic distribution of the traffic which would be attracted or produced by the development is dependent on factors such as places of employment, school locations, shopping and commercial areas, nearby dwelling units, and relative distances to these destinations. Based upon person-trip tables developed for the entire Ewa Marina Community (Increments I and II), estimates of the distribution of residential peak hour trips are as follows:



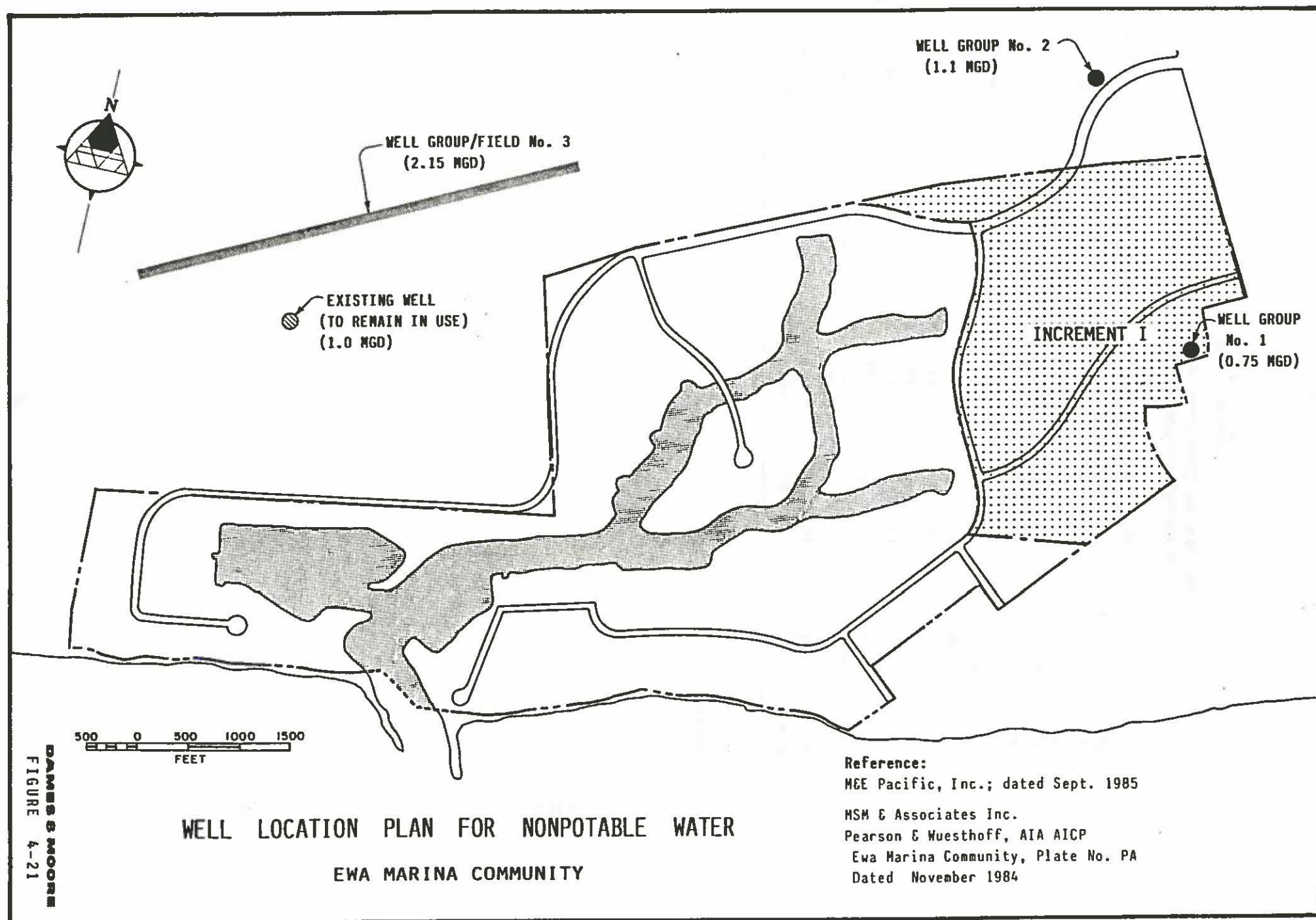


TABLE 4-3

EWA MARINA COMMUNITY WATER MASTER PLAN  
PROJECTED NON-POTABLE WATER DEMAND

<u>Parcel</u>	<u>Type</u>	<u>No. of Units</u>	<u>Flow/Unit (GPD)</u>	<u>Average Daily Demand (MGD)</u>	<u>Peak Flow (MGD)</u>
I	MD	95	149	0.01	0.02
K	LD	391	149	0.06	0.12
Q	MD	614	149	0.09	0.18
W	LD	121	149	0.02	0.04
X	LD	278	149	0.04	0.08
Y	MD	579	149	0.09	0.18
2	COMM	13.7 AC	1440	0.02	0.04
3	COMM	8 AC	1440	0.01	0.02
4	COMM	17.5 AC	1440	0.02	0.04
5	COMM	14.4 AC	1440	0.02	0.04
6	PRESERV.	27.5 AC	4080	0.11	0.22
7	COMM	11.3 AC	1440	0.02	0.04
P-1	PARK	30 AC	4080	0.12	0.24
P-3	PARK	15.6 AC	4080	0.06	0.12
P-4	PARK	4.5 AC	4080	0.02	0.04
TOTAL				0.71	1.42

Source: M&E Pacific, Inc.



**ESTIMATED DISTRIBUTION PERCENTAGES FOR EWA MARINA COMMUNITY TRIPS**

<u>Major Area</u>	<u>Percentage of Total Trips</u>
Honolulu	53
Pearl City	5
Wahiawa/Mililani	8
Waipahu	10
Makakilo	7
Waianae Coast	2
Ewa Beach	15
<b>TOTAL</b>	<b>100%</b>

These percentages represent trips to and from each area indicated. About 85 percent of trips would have destinations north of Increment II, while 15 percent would remain within Ewa Beach.

Northern traffic to and from the site would utilize Fort Weaver Road and would disperse to areas north, east or west of the project via the various ramps at the present Kunia Interchange with H-1, Renton Road, Farrington Highway, and Kunia Road. An additional north-south road, running parallel to Fort Weaver Road and connecting to Renton Road could be required near the completion of the development to accommodate the increased traffic flow. Discussions with appropriate State and City and County officials presently are underway regarding the timing and design of this roadway. Expansion of Papipi Road to its planned width of 70 feet is currently in the planning stage with the City & County of Honolulu.

#### 4.6.5 Solid Waste Disposal

Anticipated Solid Waste Generated. The 3,578 housing units and 140,000 square feet (Gross Leasable Area) of commercial space would generate an estimated 8,000 tons per year of solid waste.

Collection. Collection and disposal of solid waste generated by single family residences, such as those to be included in the Ewa Marina Community, is usually the responsibility of the City and County of Honolulu's Department of Public Works, Refuse Collection and Disposal Division. Apartment units will be served by the City or by private refuse collectors, and commercial establishments will be served by private refuse collectors. The cost for collection and disposal is currently about \$50 per ton. This amounts to a cost of \$400,000 per year for the solid waste to be generated by development within Increment II.

#### 4.6.6 Other Utilities

Other utilities, such as electricity, gas, telephone, and cable TV will be provided in accordance with applicable public utility standards by the utility companies and the developer. Street light, telephone, and electrical systems will be underground in accordance with applicable City Ordinances.

Electricity. Electrical power for the Ewa Marina Community would be provided by the Hawaiian Electric Company (HECO) and connected to the Ewa Beach Substation. Service in Increment II will be provided by HECO. Increment II may require a 46 KV substation and two additional 46 KV lines. Should this be necessary, the site for the substation would be leveled and cleared, with road access provided by the developer. The 46 KV lines would



emanate from the vicinity of HECO's Ewa Beach and Honouliuli Substations to the new proposed substation and would be strung overhead. The primary distribution system would be installed underground as required by the City and County of Honolulu. Based on HECO's load data for similar residential communities, it is estimated that Increment II and subsequent projects including residential, commercial, and parks would consume electrical energy annually as follows:

Residential	23,700,000 KWH
Commercial	770,000 KWH

Electrical requirements for the development will eventually be confirmed by HECO system planning.

In addition, residential solar hot water heaters could be implemented to reduce the demand on electrical requirements for that purpose.

Gas. Gas service required for Increment II would be provided by GASCO, Inc. of Pacific Resources, Inc. Connections to the existing system would occur where Papipi and Fort Weaver Roads abut the proposed Ewa Marina Community. These mains will be placed with the other utilities within the major and secondary road systems throughout the project area. Storage facilities would be developed by GASCO, Inc., as required.

Communications. Telephone service for Increment II would be provided by Hawaiian Telephone Company. Extension of telephone facilities to cater to the new community development, is provided by the Company, as required. Although the cost of the telephone manholes and duct system equipment would be borne by the developer, the cable installation would be at no cost to the project. Hawaiian Telephone Company would purchase a minimum of 10,000 square feet of land within the development for its switching station. The specific location would be determined at a later date. Since the site is located in a region where television reception is good, cable TV signal transmission may not be required. Television cable service for the Ewa area, however, is available through a commercial cable company.

Fire Protection. Fire protection services are provided by the City and County of Honolulu Fire Department for all non-military areas on the Island of Oahu. Increment II would be served by the existing Ewa Beach Fire Station No. 24 located in Ewa Beach at the intersection of Pohakupuna and Fort Weaver Roads. The existing Ewa Beach facility consists of a 1,250 gallon permanent pumper truck with a five-man crew on a continuous 24-hour basis. In case of major conflagrations in the area, backup service would be provided by the Waipahu Fire Station. Also available under a mutual assistance agreement is a fire protection company operated by the United States Navy at Barbers Point Naval Air Station.

Police Protection. Police protection for Increment II of the proposed Ewa Marina Community would be provided by the City and County of Honolulu Police Department. The Ewa Beach Community is currently served by the Pearl City Precinct, which operates 24-hour patrols. The Pearl City Precinct covers an extensive geographic service area, ranging from Red Hill to Kaena Point. This precinct is undergoing rapid development, currently expanding and planned new communities may not be serviced by existing manpower levels. A new "beat" may be necessary to serve Increment II and other new developments in Ewa Beach. According to the Honolulu Police Department, new developments often result in redistribution of present population and can be serviced through reallocation of available police resources.



Emergency Medical Service. Emergency medical services are provided by the City and County of Honolulu's Department of Health. A total of 12 ambulance units are stationed at strategic points throughout Oahu; the ambulance responding to Ewa Beach is located at the fire station in Waipahu. Discussions with Health Department officials indicate that Increment II can be adequately served under the existing system of ambulance deployment without placing undue stress on the overall level of service.

#### 4.7 NO ACTION ALTERNATIVE

The no-action alternative would result in an Ewa Marina Community consisting of the presently approved Increment I portion only. This would reduce the number of residential size of the community to one-third of the planned total acres, and would reduce the acreage of park land to 16 percent of the planned total acres, and the commercial/public facilities to less than 7 percent of the planned total acreage. The marina would be eliminated.

A reduction in housing would result in concomitant reductions in traffic, water and sewer requirements, electrical and telephone demands, among other public services.

This would not be an economically feasible alternative for the developer. The loss to the developer is estimated to be approximately 30 million dollars.

#### 4.8 ALTERNATIVE MARINA CONFIGURATIONS

##### 4.8.1. Housing Without the Marina

Construction of Increment II of Ewa Marina Community without the marina would allow the use of the marina-designated land into open space (park, recreational facilities or preservation), additional housing, commercial and public facilities, or a combination of these uses. This alternative could be built without Army Corps of Engineers or Department of Land and Natural Resources permits, and is an alternative within the capability of the applicant, outside the jurisdiction of the Federal and State permitting agencies. With this alternative, housing prices may be lowered; however, recreational amenities provided by the marina would be eliminated, and the economics of the development would have to be reassessed.

##### 4.8.2 Alternative Marina Size

The proposed marina size was determined based on providing a marina and other community amenities at a reasonable cost per dwelling. While the ultimate size of the marina community would be influenced by Federal, State, and County permits and approvals, site development costs per dwelling would also influence the size of the community. A large marina development would result in spreading the developing cost over a smaller number of dwellings resulting in an increased cost per dwelling. Decreasing the size of the marina would result in a lower development cost being spread over a larger number of dwellings resulting in a lower cost per dwelling. No matter what the size of the marina would be, the marina entrance channel and breakwaters would continue to interrupt public movement along the shoreline and to impact surfing sites.



#### 4.8.3 Alternative Channel Alignments

Alternative marina entrance channel alignments were developed to examine mitigating effects on surfing. Of the alternatives examined, only Alternative 3 reduces impacts on surfing. All the alignments interrupt public movement along the shore, and have no effect on the archaeological and paleontological impacts anticipated with marina and housing construction. The channel alignments interrupt littoral drift, such that beach profiling, nourishment and sand by-passing may still be required. Alternatives 1 and 2 would have a more significant effect on the beach system than the proposed action in Alternative 3.

Alternative 1 - Channel Through Oneula Beach Park. This alignment cuts the beach park in half resulting in a loss of about 9 acres of park land (See Figure 4-22). The channel and breakwaters would cut through the sand beach having an immediate impact on the beach littoral system. Beach nourishment and sand by-passing may be required to maintain the western half of the beach. Disturbing the beach park was considered unacceptable; flushing evaluations were, therefore, not computed for this alternative.

Alternative 2 - Channel on the east boundary of Oneula Park. This alignment essentially cuts Oneula Park from the existing road access forcing park users to circle around the development to use the park (see Figure 4-23). Down drift erosion to the beach park would probably occur requiring sand nourishment and by-passing. Marina water residence time in basin F in the marina would be increased by 5.6 days.

Alternative 3 - Channel 300 yards west of proposed channel. Alternative 3 is depicted in Figure 4-24. This alignment eliminates any impacts to Oneula Beach Park and significantly reduces adverse effects on the surfing sites. However, the alternative would:

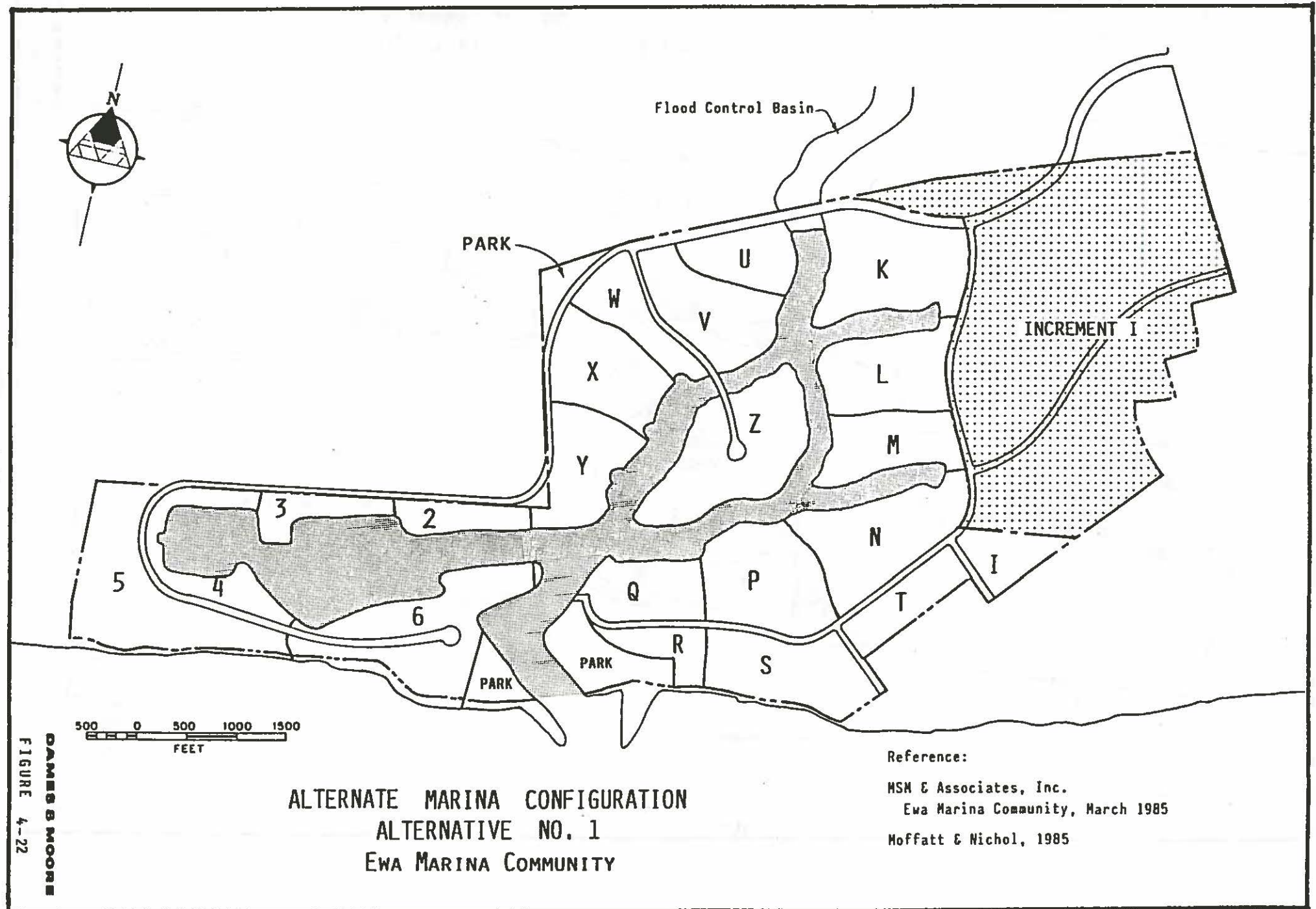
- a. increase water residence time in the marina
- b. increase the internal travel time within the marina
- c. increase land and dredging costs
- d. increase automobile traffic bound for the commercial area through the community and park.

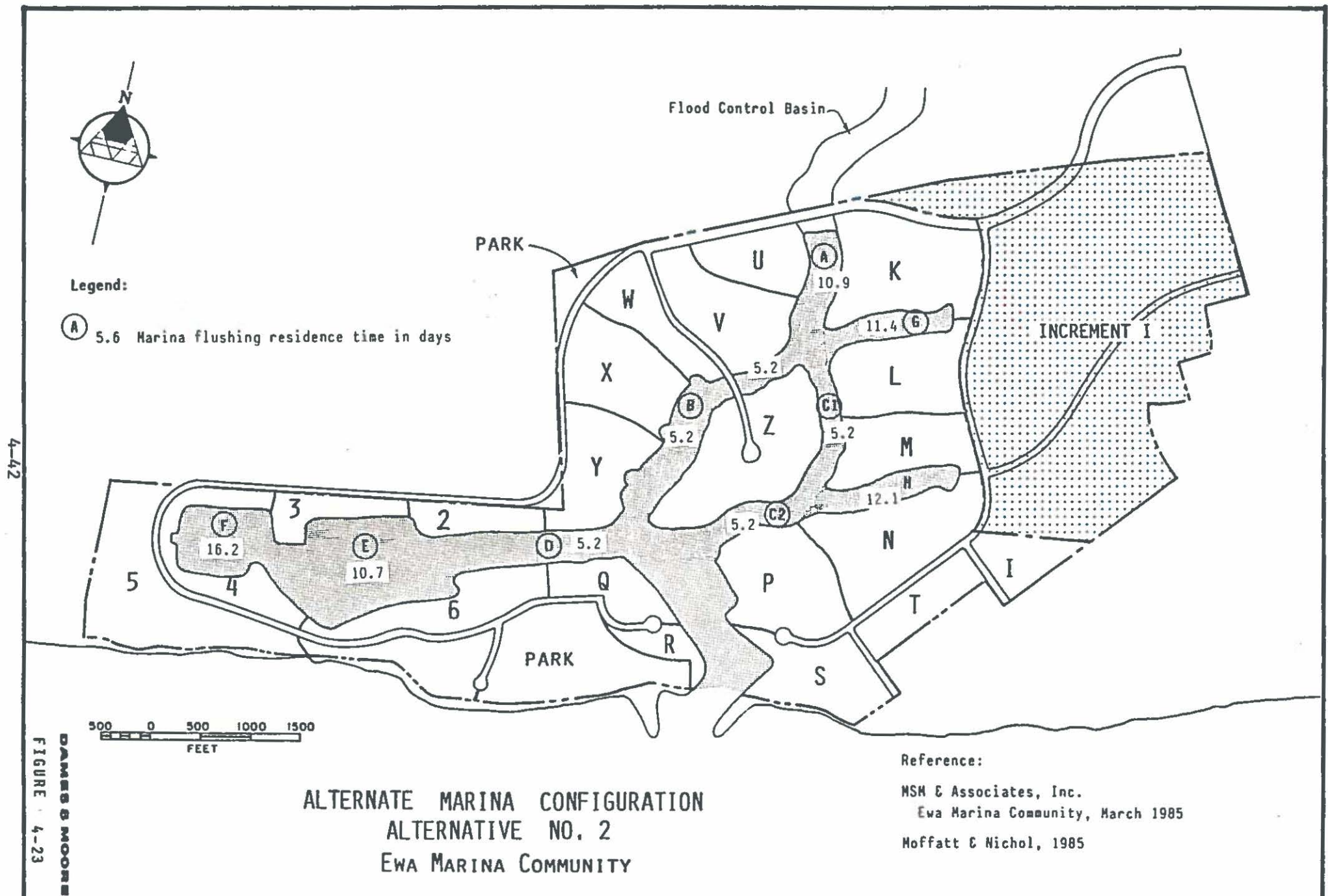
Alternative 4 - Eliminate the jetties. This alternative was assessed to reduce the probable impacts of the littoral system. Even though the jetties were eliminated, the entrance channel would effectively trap sand moving westward along the shoreline. Thus, the elimination of the jetties would not reduce littoral drift interruption. Sand trapped in the entrance channel would probably be lost from the littoral system, whereas the jetty would allow some sand to be trapped and by-passed, if necessary, saving the sand within the littoral system. Elimination of the jetties would reduce the impact on one of the identified surfing sites.

#### 4.9 ALTERNATIVES OUTSIDE THE CAPABILITY OF THE APPLICANT, BUT WITHIN THE JURISDICTION OF THE PERMITTING AGENCIES

The nature of this alternative is to meet the proposed project needs through services provided by the permitting agencies. At the present time,





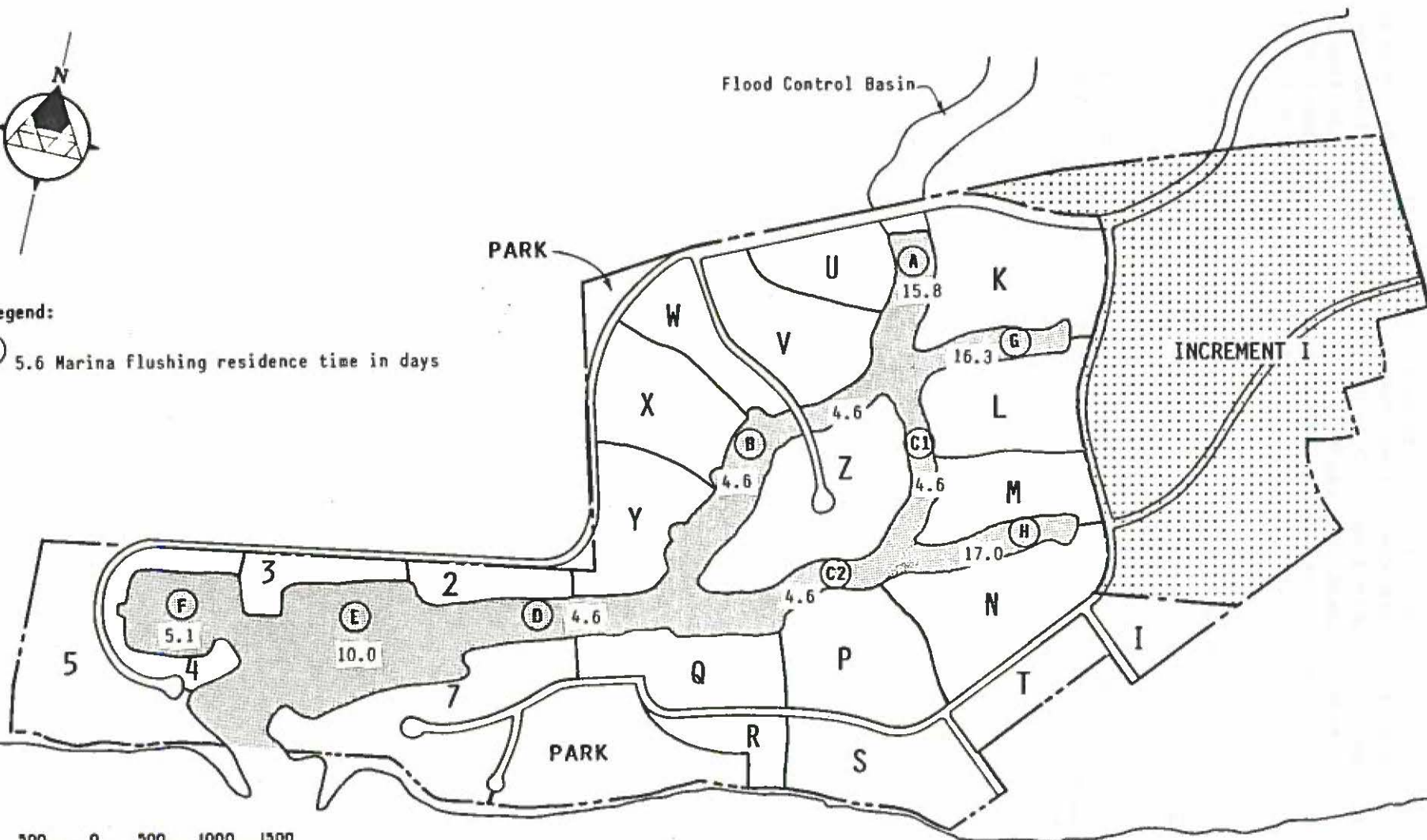






Legend:

(A) 5.6 Marina flushing residence time in days



500 0 500 1000 1500  
FEET

ALTERNATE MARINA CONFIGURATION  
ALTERNATIVE NO. 3  
EWA MARINA COMMUNITY

Reference:

MSM & Associates, Inc.  
Ewa Marina Community, March 1985  
Moffatt & Nichol, 1985

none of the permitting agencies have programs that can provide the same benefits at Ewa that would result from the proposed development. The Corps of Engineers, has an authorized small boat harbors project at Barbers Point. However, the State of Hawaii has requested Corps of Engineers to indefinitely defer the authorized project. At the time the project was authorized, the small boat harbor would have accommodated 300 craft (Corps of Engineers, 1985).

#### 4.10 ALTERNATIVES BEYOND THE CAPABILITY OF THE APPLICANT AND THE PERMITTING AGENCIES

The nature of this alternative is to meet the proposed project needs through the programs of other private organizations or government agencies. At the present time, no government agencies can provide similar public benefits or meet the project needs at Ewa. No known private entity, other than the applicant, is presently available to provide similar public benefits.



## 5.0 THE EXISTING ENVIRONMENT

### 5.1 GENERAL

The Ewa Marina Community property occupies 565.7 acres of the 20,000-acre Honouliuli Plain. The property is generally rectangular in shape with its long dimension paralleling the ocean. At roughly the midpoint of the overall project is Oneula Beach Park, a 30-acre City and County public park. The town of Ewa Beach lies to the east. Barbers Point Naval Air Station is adjacent to the property on the west. Ewa Plantation Village is north of the community. The location of the project is shown on Figure 4-1.

Within the Ewa Plain are the Campbell Industrial Park and the Barbers Point Deep Draft Harbor, which is currently under construction. The Pearl Harbor Naval Shipyard, Hickam Air Force Base, and the Honolulu International Airport, are major employment centers also located within the Ewa Plain.

The proposed project area is generally flat. Ewa Marina property rises from sea level to an elevation of approximately 20 feet at the northern boundary of the project. The geology of the area is a coral-shelf with a thin soil cover. The adjacent off-shore areas are used for boating, fishing, seaweed (limu) picking, and surfing.

### 5.2 EXISTING LAND USE

The northern two-thirds of the site presently is leased by Campbell Estate to Oahu Sugar Company for growing sugar cane, while the southeastern portion houses a chicken farm and a few small residences on short-term leases. The remainder of the project area is undeveloped and covered with coastal strand vegetation and kiawe trees. Portions of the site, particularly along Papipi Road and the area around Oneula Beach Park are used as an unauthorized dumping ground for abandoned vehicles and trash.

#### 5.2.1 State Land Use Districts

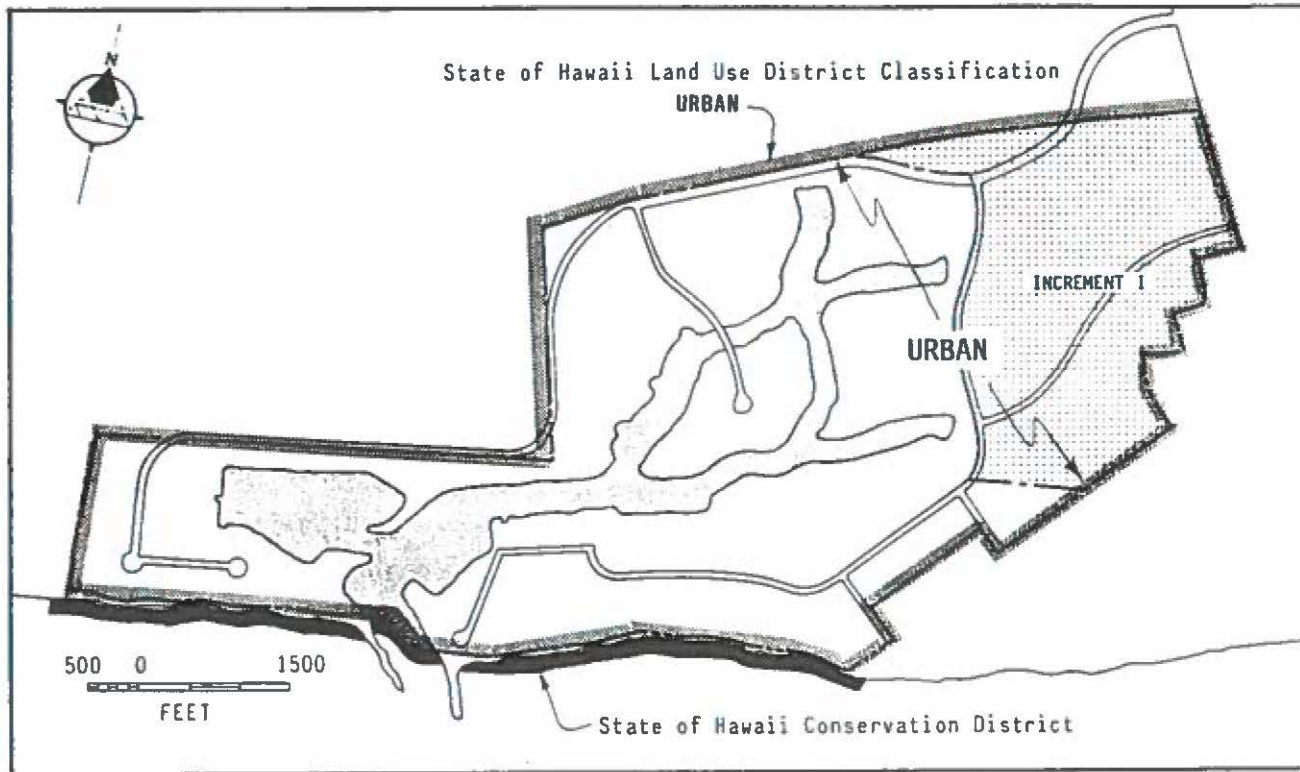
The Increment II area is presently designated predominantly "urban" by the State of Hawaii. The southern shoreline is designated a Conservation District by a State of Hawaii DLNR. The Conservation District extends seaward from the certified shoreline (approximately equivalent to the start of terrestrial vegetation). The State of Hawaii land use districts are depicted in Figure 5-1.

#### 5.2.2 City and County Zoning

Of the 565.7 acres involved in Increment II, about 340 acres are zoned "Urban", and about 180 acres "Residential" by the City and County of Honolulu. These areas are depicted on Figure 5-1.

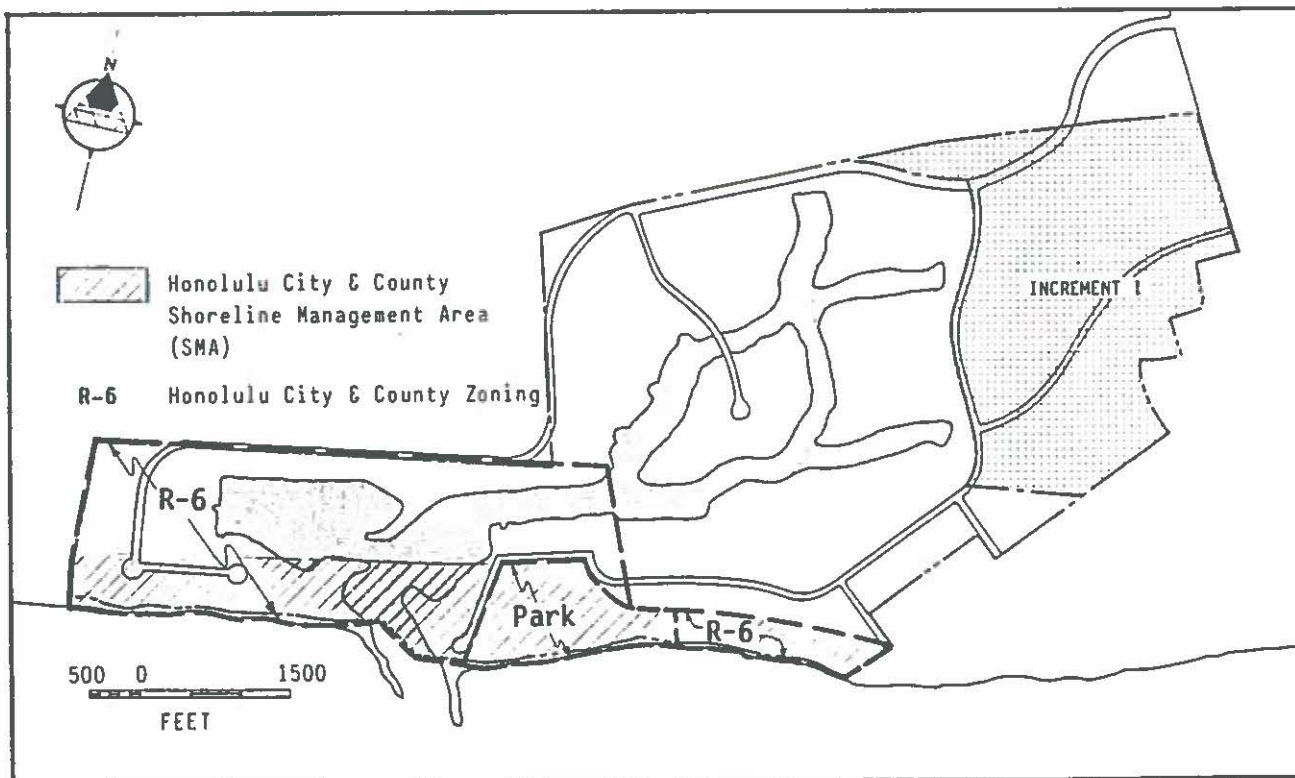
#### 5.2.3 Shoreline Management Area

The Increment II shoreline lies with the City and County of Honolulu Shoreline Management Area (SMA) designation. The SMA begins at the "certified



Source: State of Hawaii, Department of Land & Natural Resources, 1984

## STATE OF HAWAII



Source: Honolulu City & County, Department of Land Utilization, 1984

## HONOLULU CITY & COUNTY

### EXISTING LAND USE DESIGNATIONS INCREMENT II - EWA MARINA COMMUNITY



shoreline" (roughly the high tide line) and extends 1,000 feet in-land for the length of the shoreline. This area is depicted on Figure 5-1.

### 5.3 ATMOSPHERIC SCIENCES

#### 5.3.1 Meteorology

The climate of the project area is constant and relatively dry, with prevailing trade winds providing a moderating and cooling influence.

Winds. Wind data are available from the Naval Air Station at Barbers Point located immediately west of the proposed project site. Data compiled from 1949 through 1979 are summarized in Table 5-1. These data indicate that the dominant wind feature in the Barbers Point area is the northeast tradewinds. The tradewinds blow across the area 85 percent of the time at an average of 9 knots per hour.

Temperature. Temperature in the project area is nearly uniform, ranging from 72 to 80 degrees Fahrenheit (°F). Climatic data taken at Honolulu International Airport in 1983 show the warmest monthly average temperature is 80.7°F and the coolest monthly average temperature is 72.3°F. The highest temperature of record is 93°F and the lowest temperature of record is 53°F.

Precipitation. The Ewa Plain experiences light rainfall approximately 20 inches per year. Monthly temperature and precipitation data are summarized on Table 5-1.

#### 5.3.2 Air Quality

Air Quality Standards. In order to compare ambient pollutant concentrations to known adverse effects, air quality standards were established by both Federal and State agencies. National Ambient Air Quality Standards (NAAQS) specify acceptable pollutant concentrations which may be equalled and, in the case of short-term standards, exceeded up to once per year. Hawaii Ambient Air Quality Standards (HAAQS) also specify unacceptable pollutant concentrations. The current (1982) NAAQS and HAAQS are given in Table 5-2.

The U.S. Environmental Protection Agency (EPA) has designated all areas of the United States as having air quality better than the NAAQS (attainment areas) or worse than the NAAQS (nonattainment areas) (Title 40 Code of Federal Regulations Part 80). EPA has designated the project site as an attainment area for all pollutants.

Existing Emissions Inventory Data. The Hawaii State Department of Health inventories sources of pollutants within the City and County of Honolulu. Pollutants tabulated include sulfur oxides, particulate matter, carbon monoxide, hydrocarbons, and nitrogen oxides emissions. Emissions tabulated by source type are presented in Table 5-3. Motor vehicles are the major air pollutant emission source in Honolulu.

Existing Air Quality. Two ambient air quality monitoring stations are near the project area. The Barbers Point monitoring station is located at the

TABLE 5-1

## NORMAL CLIMATOLOGY AT BARBERS POINT

Month	Temperature (°C)					Precipitation (cm)				% Rel Hum LST <sup>b</sup> 04 13	Avg Dew Pt (°C)	Bar Pres (mb)	Wind			Avg Cld %	Avg Trw Days <sup>c</sup>
	Average			Extreme		Avg	Max	Min	Max 24 Hrs				Avg Dir	Speed (m/s)			
	Max	Min	Avg	Max	Min									Avg	Max		
Jan	26.1	18.9	22.8	30.6	10.0	11.2	35.8	1.3	13.5	82 64	17.2	999	NE	4.1	30.9	0.5	1
Feb	26.1	18.3	22.2	30.6	11.1	6.1	25.4	T <sup>a</sup>	11.7	81 63	16.7	1003	NE	4.1	26.2	0.5	1
Mar	26.1	18.9	22.8	30.6	12.2	6.4	43.9	0.3	26.7	80 61	17.2	1005	NE	4.1	19.5	0.5	* <sup>d</sup>
Apr	26.7	20.0	23.3	30.6	12.2	3.8	30.5	T	9.9	79 60	17.2	1005	NE	4.6	20.1	0.5	1
May	27.8	20.6	24.4	32.2	16.1	2.3	21.6	T	8.1	79 59	17.8	1009	NE	4.1	19.5	0.5	*
Jun	28.9	21.7	25.0	32.2	16.1	0.8	5.1	T	3.6	77 58	18.3	999	NE	4.1	20.1	0.5	*
Jul	29.4	22.2	26.1	33.3	17.8	0.8	3.0	T	3.0	78 58	18.9	1010	NE	4.6	19.0	0.5	*
Aug	29.4	22.8	26.1	34.4	16.1	0.8	5.3	T	4.8	78 57	19.4	1009	NE	4.6	23.1	0.5	*
Sep	30.0	22.2	26.1	33.9	17.2	1.0	4.3	T	3.6	78 58	19.4	1007	NE	4.1	21.6	0.4	*
Oct	28.9	21.7	25.6	32.8	16.1	3.6	31.2	T	20.1	80 60	19.4	1007	NE	4.1	18.5	0.5	*
Nov	27.8	21.1	24.4	31.7	13.9	7.4	29.7	T	17.8	81 62	18.9	1005	NE	4.1	24.2	0.5	1
Dec	26.7	19.4	23.3	31.1	11.7	7.4	20.3	0.3	11.9	80 62	17.8	1003	NE	4.1	23.1	0.5	1
Annual	27.8	20.6	24.4	34.4	10.0	4.1	43.9	T	26.7	79 60	18.3	1005	NE	4.1	30.9	0.5	6

<sup>a</sup> T = Trace<sup>b</sup> Relative humidity at Hawaiian standard time 0400 and 1300 hours.<sup>c</sup> Average thundershower days<sup>d</sup> \* = Less than 0.5 days

Reference: U.S. Navy, 1981, 1982 Climatological, astronomical and tidal data for the Hawaiian Islands - Barbers Point climatology, compiled from data January 1949 through September 1979, Naval Oceanography Command, NAVWESTOCEANCEN.



TABLE 5-2

## AMBIENT AIR QUALITY STANDARDS

Pollutant <sup>a</sup>	Averaging Time	Hawaii Standards	National Standards	
			Primary <sup>b</sup>	Secondary <sup>c</sup>
Photochemical Oxidants	1-hour	100	240	
Suspended Particulate Matter	Annual Geometric Mean	--	75	60
	24-hour	100	260	150
	Annual Arithmetic Mean	55	--	--
Sulfur Dioxide	Annual Arithmetic Mean	20	80	--
	24-hour	80	365	--
	3-hour	400	--	1300
Carbon Monoxide	8-hour	5	10	
	1-hour	10	40	
Hydrocarbons: Non-Methane	3-hour	100	160	
Nitrogen Dioxide	Annual Arithmetic Mean	70	100	
	24-hour	150	--	
Lead	Calendar Quarter	1.5	1.5	

<sup>a</sup> Measured in micrograms per cubic meter.

<sup>b</sup> Designed to prevent against adverse effects on public health.

<sup>c</sup> Designed to prevent against adverse effects on public welfare including effects on comfort, visibility, vegetation, animals, aesthetic values, and soiling and deterioration of materials.

TABLE 5-3

SOURCES OF AIR POLLUTANT EMISSIONS  
FOR HONOLULU COUNTY: 1980<sup>a</sup>

Source	Percent Distribution <sup>b</sup>	
Transportation		47.4
Motor Vehicles	43.9	
Aircraft	2.9	
Vessels	0.6	
Fuel Combustion in Stationary Sources		26.7
Steam Electric	24.6	
Gas Utilities	0.1	
Agricultural Fuel	2.0	
Industrial Process Losses		20.3
Refinery	6.5	
Petroleum Storage	0.8	
Metalurgical	0.1	
Mineral Products	10.8	
Off-highway Construction, Farms and Industries	2.1	
Municipal Incinerator		1.3
Agricultural Burning		4.3
Total		100.0

<sup>a</sup>Source: Hawaii State Department of Health, Environmental Permits Branch, information provided April 26, 1983. Data presented represents the sum of SO<sub>2</sub>, particulates, CO, hydrocarbons and NO<sub>x</sub> emissions.

<sup>b</sup>Percent distribution for the sums of weights of sulfur oxides, particulate matter, carbon monoxide, hydrocarbons, and nitrogen oxide emissions.



Standard Oil Refinery Complex in Campbell Industrial Park, approximately 1 mile west of the project area. The Pearl City monitoring station is in an area of commercial and residential units approximately six and one-half miles northeast of the project area.

For a more complete evaluation of air quality indicators, air quality data from two, more distant monitoring stations were examined. These included the Sand Island and Honolulu monitoring station. The Sand Island monitoring station is approximately two miles southwest of downtown Honolulu. The station generally monitors light industrial, commercial, recreational, and harbor emission sources. The Department of Health station in downtown Honolulu generally monitors commercial, institutional, and residential sources.

Air quality data for monitoring stations located at Barbers Point, Pearl City, Sand Island, and Department of Health are presented in the following sections. Air quality data for the last five available calendar years (1979 through 1983) were used to evaluate the existing air quality. The downtown measurements are presented to provide an indication of regional air quality. Table 5-4 gives a summary of pollutants sampled at each air monitoring station.

Photochemical Oxidants -- Oxidants are formed in the atmosphere in the presence of sunlight by a series of chemical reactions involving oxides of nitrogen and reactive hydrocarbons. The NAAQS for ozone ( $O_3$ ) is 240 micrograms per cubic meter ( $ug/m^3$ ) and the HAAQS is 100  $ug/m^3$ . Both standards are for 1-hour averaging times.

Photochemical oxidants have not been measured at the Barbers Point, Pearl City monitoring stations. Maximum measured 1-hour oxidant concentrations at the downtown Honolulu station are shown in Table 5-5. The HAAQS have not been exceeded in the time period analyzed. Because there are no major sources upwind of the project site, the HAAQS probably are presently being met at the proposed project site.

Carbon Monoxide -- Carbon monoxide (CO) is a colorless, odorless, tasteless gas under atmospheric conditions. The 1-hour NAAQS for CO is 40  $ug/m^3$ , while the HAAQS for the same time period is 10  $ug/m^3$ .

Carbon monoxide has not been measured at the Barbers Point and Pearl City monitoring stations. Maximum 1-hour concentrations for the downtown Honolulu station are shown in Table 5-6. There were no violations of the 1-hour NAAQS for any of the years presented. While the HAAQS was exceeded 10 times in 1979, there has been no instance of exceedance since that time.

Nitrogen Dioxide -- Nitrogen dioxide ( $NO_2$ ) is an indirect product of fuel combustion by industrial sources and motor vehicles. For  $NO_2$ , the 24-hour HAAQS is 150  $ug/m^3$  and the annual NAAQS is 100  $ug/m^3$ .

Maximum  $NO_2$  concentrations at the Sand Island site are shown in Table 5-7. Ambient  $NO_2$  was only reported in 1981 and did not exceed the HAAQS for that year. Because there are no major sources in the Ewa Marina Community Area, this standard is probably presently being met at the proposed project site.

TABLE 5-4

SUMMARY OF POLLUTANTS SAMPLED AT EACH  
AIR MONITORING STATION, 1979-1983

<u>Site Location</u>	<u>Contaminant Measured</u>					<u>Lead<sup>a</sup></u>
	<u>Particulate Matter<sup>a</sup></u>	<u>Carbon Monoxide<sup>b</sup></u>	<u>Photochemical Oxidants<sup>b</sup></u>	<u>Nitrogen Dioxide<sup>b</sup></u>	<u>Sulfur Dioxide<sup>b</sup></u>	
Barbers Point	X				X	
Pearl City	X				X	
Sand Island <sup>c</sup>			X	X		
Department of Health	X	X	X		X	X

<sup>a</sup> 24-hour sampling.<sup>b</sup> Continuous sampling.<sup>c</sup> Began NO<sub>2</sub> sampling on February 4, 1981.

Source: State of Hawaii, 1983



TABLE 5-5

MAXIMUM MEASURED 1-HOUR OXIDANT CONCENTRATIONS  
(Concentrations in ug/m<sup>3</sup>)

Year	Monitoring Site	
	Department of Health	Sand Island
1979	80	-
1980	84	-
1981	-	104
1982	-	151
1983	-	123

Number of Times HAAQS Exceeded

Year	Monitoring Site	
	Department of Health	Sand Island
1979	0	-
1980	84	-
1981	-	1
1982	-	2
1983	-	2

- = no data available

Source: State of Hawaii, 1983

TABLE 5-6

MAXIMUM MEASURED 1-HOUR  
CARBON MONOXIDE CONCENTRATIONS  
(Concentrations in ug/m<sup>3</sup>)

<u>Year</u>	<u>Monitoring Site</u>
	<u>Department of Health</u>
1979	17.3
1980	3.5
1981	-
1982	4.6
1983	8.6

Number of Times HAAQS Exceeded

<u>Year</u>	<u>Monitoring Site</u>
	<u>Department of Health</u>
1979	10
1980	0
1981	-
1982	0
1983	0

- = no data available

Source: State of Hawaii, 1983



TABLE 5-7

MAXIMUM MEASURED  
24-HOUR NITROGEN DIOXIDE CONCENTRATIONS  
(Concentrations in ug/m<sup>3</sup>)

<u>Year</u>	<u>Monitoring Site</u>
	<u>Sand Island</u>
1979	-
1980	-
1981	77
1982	-
1983	-

Number of Times HAAQS Exceeded

<u>Year</u>	<u>Monitoring Site</u>
	<u>Sand Island</u>
1979	-
1980	-
1981	0
1982	-
1983	-

- = no data available.

Source: State of Hawaii, 1983

Sulfur Dioxide -- Sulfur dioxide ( $\text{SO}_2$ ) is a colorless, irritating gas under atmospheric conditions. The 24-hour HAAQS for  $\text{SO}_2$  is  $80 \text{ ug/m}^3$  and the primary NAAQS for the same time frame is  $365 \text{ ug/m}^3$ .

Maximum  $\text{SO}_2$  concentrations in the project area and the downtown monitoring station are shown in Table 5-8. There was a single exceedance of the 24-hour HAAQS at the Barbers Point monitoring site in 1983.

Particulate Matter -- Any dispersed matter, solid or liquid, in which the individual aggregates are larger than a single molecule in diameter, but smaller than 500 microns, is considered ambient particulate matter (PM). For 24-hour averaging times, the HAAQS for PM is  $100 \text{ ug/m}^3$  and the primary NAAQS for PM is  $260 \text{ ug/m}^3$ .

Maximum particulate matter concentrations recorded at the three monitoring sites are shown in Table 5-9.

Based upon the Barbers Point particulate sampler data, present total suspended particulate (TSP) levels at the proposed Ewa Marina Community are likely to meet the more stringent state standards. Occasional excursions above the TSP standard may occur due to cane field fires.

#### 5.4 TOPOGRAPHY

The proposed project area is situated on the southern edge of the Ewa Coastal Plain. The coast plain has a relatively regular surface that slopes gently to the south in a downward direction at about a grade of 20 feet per mile. The northern, central, western and northeastern portions of the project area have been leveled and ditched for the sugar cane cultivation. The topography of the project site is presented in Figure 5-2. A wetland is located on the western portion of the property.

The southern portion of the project area is marked by a 3- to 5-foot high, wave-cut escarpment in the vicinity of Oneula Beach Park. The escarpment rises in elevation towards the west.

#### 5.5 GEOLOGY AND SOILS

The proposed project is situated on the southern edge of the Ewa Coastal Plain which is composed chiefly of marine sediments. Basalts of the Koolau series at depths of about 800 to 1,000 feet underlay the marine sediments. A geology study was performed by Geolabs-Hawaii (1979) for the project.

Three different marine sediments have been identified in the project area: filled land, beach sand, and coral outcrop.

The filled land contains mixtures of the coralline/algal carbonates, alluvial debris derived from volcanic rocks and residual clays, as well as peat deposits. This material was reported to have a loose to medium dense consistency (GEOLABS-Hawaii, 1979). The beach sand consists of about a foot



TABLE 5-8

MAXIMUM MEASURED  
24-HOUR SULFUR DIOXIDE CONCENTRATIONS  
(Concentrations in  $\mu\text{g}/\text{m}^3$ )

Year	Monitoring Site		
	Barbers Point	Pearl City	Dept. of Health
1979	27	63	42
1980	10	15	60
1981	40	5	44
1982	12	10	38
1983	95	5	16

Number of Times HAAQS Exceeded

Year	Monitoring Site		
	Barbers Point	Pearl City	Dept. of Health
1979	0	0	0
1980	0	0	0
1981	0	0	0
1982	0	0	0
1983	1	0	0

Source: State of Hawaii, 1983

TABLE 5-9

MAXIMUM MEASURED  
24-HOUR PARTICULATE MATTER CONCENTRATIONS  
(Concentrations in  $\mu\text{g}/\text{m}^3$ )

Year	Monitoring Site		
	Barbers Point	Pearl City	Dept. of Health
1979	223	48	62
1980	158	93	103
1981	188	71	75
1982	63	54	42
1983	193	57	58

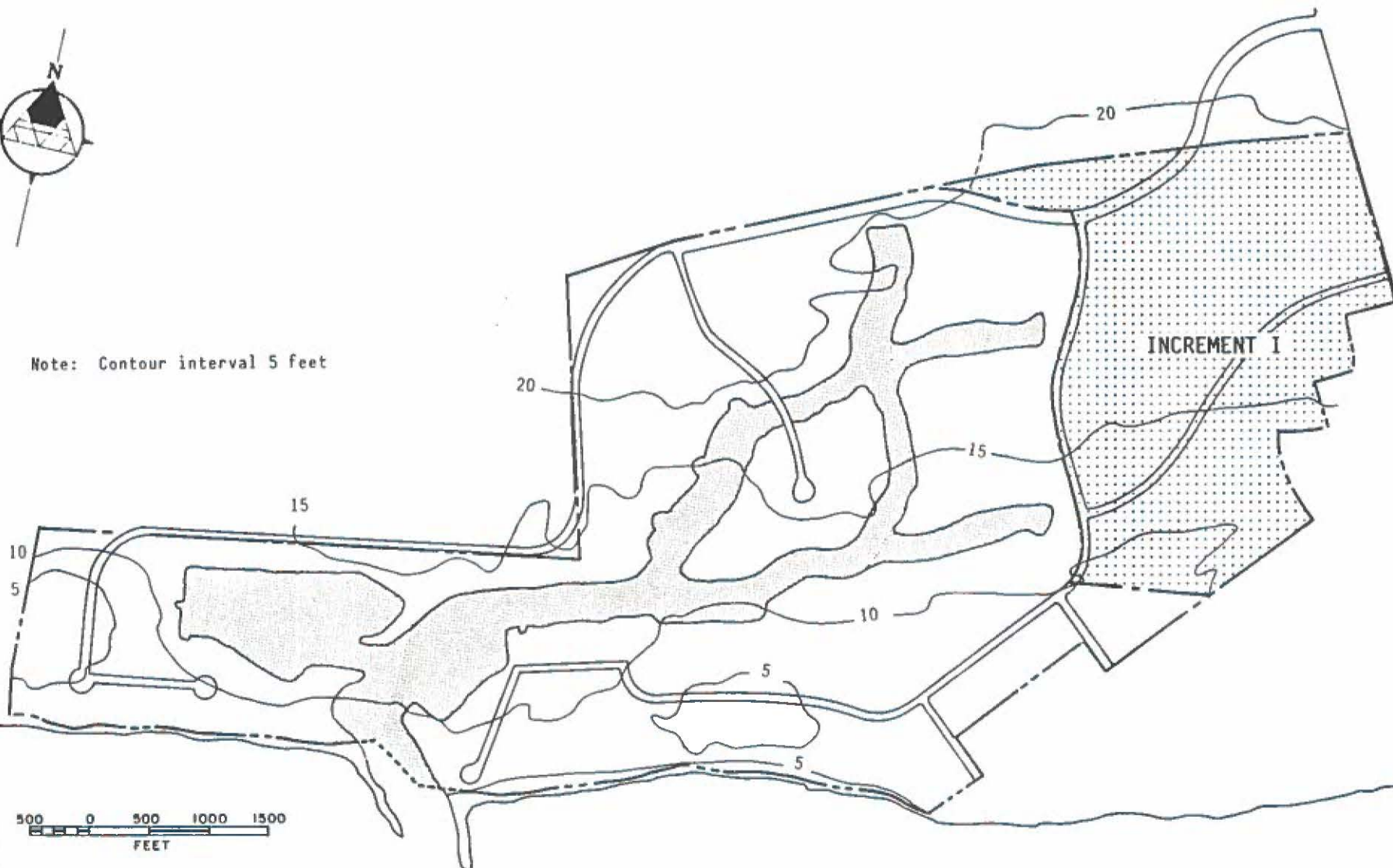
Number of Times HAAQS Exceeded

Year	Monitoring Site		
	Barbers Point	Pearl City	Dept. of Health
1979	10	0	0
1980	2	0	1
1981	2	0	0
1982	0	0	0
1983	2	0	0

Source: State of Hawaii, 1983



Note: Contour interval 5 feet



EXISTING TOPOGRAPHY  
EWA MARINA COMMUNITY

Reference: M & E Pacific, 1985



of soil above coral/algal limestones with the wetland area containing bog-type peat deposits.

The coral/algal limestones vary in porosity, hardness, and degree of chemical degradation. Some of the coral/algal reef limestones have undergone chemical degradation and have developed into a natural clay enriched Mamala soil. The Mamala soil consists of granule to cobble biocarbonates and of thick to moderately thick organic mats. This non-expandive soil is highly plastic and normally found in small voids, sinks, and other depressions. The biocarbonate sand gravel, clay granule-cobble mixtures vary in density and degree of hardness. This material has been reported to vary from medium dense to very hard with occasional soft soils and subsurface voids. Most of the less dense soils and voids were encountered at depths exceeding 20 feet below ground surface, probably due to the solution at the depth of carbonates with redeposition occurring near ground surface.

A soils investigation for the Barbers Point Ocean Outfall System EIS completed along the alignment of the Barbers Point ocean outfall indicated that the coralline limestone unit contains numerous solution cavities of various shape and size. Many of the cavities have been filled or partially filled with calcareous material derived from the breakup of old coral reefs, some cavities have been filled or partially filled by stream-laid alluvium derived from the erosion of volcanic, calcareous, and older sedimentary rocks.

Geophysical investigations of the offshore and project area completed for the Barbers Point Ocean Outfall System EIS present no evidence of subsurface motion or faulting. No fault-related structures were observed.

## 5.6 HYDROLOGY

### 5.6.1 Groundwater

Groundwater in the Barbers Point area occurs in two aquifers, the deeper Koolau Volcanics and the overlying coral aquifer. The higher quality aquifer is the Koolau Volcanic Series. The coral aquifer locally contains brackish to salt water.

Marine, clay, and silt sediments and alluvium separate the Koolau Volcanics from the coral aquifer. The marine sediments and alluvium are materials of low permeability, which form an aquiclude. Under nonpumping conditions, this aquiclude retards the flow of water from the Koolau Volcanics to the coral aquifer.

The coral aquifer directly overlies the marine sediments and interfingers with the alluvium. The coral aquifer is several hundred feet thick. According to the Board of Water Supply, 1,000-foot deep test holes drilled by the University of Hawaii at Ewa Beach encountered seven sedimentary aquifers.

Precipitation in the Koolau Range infiltrates to supply basal ground water in the Koolau Volcanics. Basal water consists of a fresh body of water floating on salt water. This occurs because the density of fresh water is less than that of salt water. However, in the project area the basal aquifer consists almost entirely of salt water.



The coral aquifer is recharged by direct infiltration of rainfall, infiltration of stream runoff, and infiltration of irrigation water applied in excess of crop requirements. The water in the coral aquifer consists of a thin lens of fresh to brackish water overlying salt water. Because of the mixing due to the tides the brackish ground water grades into sea water as it approaches the shore. Discharge from the coral aquifer is to the ocean.

#### 5.6.2 Surface Drainage

The proposed project area is located within the Kaloi Gulch Flood Plain, a 11.5-square mile watershed. Normally storm water runoff and related sedimentation through the project area is absorbed in the agricultural zone, mauka of the project area. Hydrologic analysis indicates an anticipated 100-year 6-hour design storm would generate a runoff of approximately 13,700 cubic feet per second (CFS) at the northern boundaries of the project. Annual sediment discharge into the project area has not been measured, although it has been estimated at approximately 13,000 tons.

### 5.7 TERRESTRIAL BIOLOGY

The flora of the proposed project site has been studied by Char (1980) and Char and Balakrishnan (1979). To augment the previous studies, a survey of the Ewa Marina Community Increment II site was conducted by Whistler in 1984.

The present terrestrial vegetation in the Increment II area can be divided into two types: (1) natural communities which are comprised of "climax vegetation" that is in dynamic equilibrium with its environment and which will remain essentially the same barring further disturbance, climatic change, or introduction of competing species; and (2) disturbed communities comprised of vegetation that is currently or constantly being modified by man and which is not in dynamic equilibrium with its environment. The vegetation can be divided up into six plant communities--four of them natural (littoral strand, Batis swamp, Pluchea scrub, and Prosopis forest) and two of them disturbed (ruderal areas and cane fields). These six communities are discussed below and are shown in Figure 5-3.

#### 5.7.1 Plant Communities

Littoral Strand. The littoral strand actually consists of two subtypes--rock strand and sand strand. The rock strand, which occupies the coast from the western margin of Oneula Beach Park to Nimitz Beach, is dominated by low, often herbaceous littoral plants which are adapted to the salt spray, bright sunlight, and the rocky substrate of this habitat. The dominant species on the undisturbed portions of this habitat are Sesuvium portulacastrum ('akulikuli) and Sporobolus virginicus ('aki'aki). Also present are Lycium sandwicense ('ohelo-kai), Batis maritima (pickleweed), Atriplex semibaccata (Australian saltbush), and Boerhavia repens (alena). Much of the area is disturbed by a dirt road and the activities of fishermen. In this area weedy species dominate, such as Cynodon dactylon (Bermuda grass), Chenopodium murale (nettle-leaved goosefoot), Verbesina encelioides (golden crown-beard), Atriplex semibaccata, and a number of others.





## EWA MARINA COMMUNITY



The sand strand community occurs in Oneula Beach Park, but is highly disturbed by the activities of fishermen and beach-goers. The native vegetation of this habitat probably consisted of littoral shrubs such as Scaevola taccada (naupaka) and beach creepers such as Ipomoea pes-caprae (pohuehue), but only remnants of this remain. Along with these remnants are thickets of Pluchea indica (Indian pluchea) and Pluchea odorata (pluchea), as well as a number of weeds characteristic of disturbed habitats in the area.

Batis Swamp. On the western end of the project site, next to the perimeter of the Barber's Point Naval Air Station, is a small area of about nine acres extent which may be classified as a wetland. A wetland may be defined as any area where water is the major factor controlling the development of soils and the development of the vegetative cover, if present. It can usually be recognized by the presence of hydrophytes, i.e. water-loving plants.

The area is covered almost entirely by a stand of Batis maritima (pickleweed) whose tangled, succulent stems form a dense mat less than 18 inches in height. Most of the swamp is very saline, and a coating of salt crystals can be seen in low-lying places. There are, however, areas where freshwater either accumulates or wells up, and these areas are often marked by patches of Scirpus paludosus, a native species of bulrush. Some of the puddles of water that were present contained freshwater insect fauna (e.g. predacious diving beetles).

The swamp is in a highly disturbed condition, as jeeps and/or motorcycles have damaged what would otherwise be 100% vegetative cover. It is estimated that about 80% of the swamp is covered with Batis and about 12% by the barren road tract making a circle near the perimeter of the swamp. The second most abundant species is Scirpus paludosus, with only small amounts of Pluchea odorata, Pluchea indica, and the parasitic Cassytha filiformis, and even less of Sporobolus virginicus and Heliotropium curassavicum. In all, native species probably have a combined dominance of about 5 percent, and none of these species is endemic.

Pluchea Scrub. The Pluchea scrub is the vegetation dominated by shrubs of the genus Pluchea. Three types of pluchea are found in the area--P. indica (Indian pluchea), P. odorata (pluchea), and a hybrid between the two known as P. x fosbergii. These introduced shrubs grow in dense thickets up to 10 feet in height forming a ring around the Batis swamp, as well as a zone between the littoral strand and the Prosopis forest. These shrubs are somewhat halophytic, but their scarcity within the Batis swamp indicates that they cannot cope with such a highly saline soil or cannot compete with the more halophytic Batis.

The ring of Pluchea scrub around the Batis swamp is dominated by the three kinds of pluchea at the exclusion of all others, but in the littoral zone of the scrubby vegetation, Leucaena leucocephala (koa haole), windswept Prosopis pallida (kiawe), and several small stands of Myoporum sandwicense (naio) and Cordia subcordata (kou) are also found. Ipomoea indica (koali), a native species of morning glory, is often found growing over the other vegetation. In addition to the parasitic, leafless vine Cassytha filiformis which overgrows the pluchea shrubs around the swamp, only two other plants were found here -- Naio and koali, both of which are native, but not endemic.



Prosopis Forest. This forest is by far the largest of the natural plant communities present at the site. As its name implies, it is dominated or characterized by Prosopis pallida, the introduced kiawe tree which has become the dominant tree species in the dry, disturbed lowlands of Hawaii once occupied by the native sclerophyllus forest of wiliwili.

Over most of this community, the kiawe trees form an irregular canopy about 30-60 feet in height. Most of the kiawe trees are large and spaced, but between them is a dense stand of Leucaena leucocephala (koa haole) growing up to 30 feet in height and filling in the gaps in the Prosopis canopy.

The only other trees found in this community during the present field work were Schinus terebinthifolius (Christmas berry), a few Brassaia actinophylla (umbrella tree), several Syzygium cumini (java plum), and a few saplings of Erythrina variegata (wiliwili haole), although as will be noted in the discussion to follow, at least one Santalum ellipticum ('ili-ahi, sandalwood) and one Erythrina sandwicensis (wiliwili) were reported from there in 1980.

In the closed Prosopis forest, the ground cover is very sparse in most places, and is composed primarily of Asystasia gangetica (Chinese violet) and Achyranthes indica. In areas where the forest is more open, weedy species such as Setaria verticillata (bristly foxtail), Malvastrum coromandelianum (false mallow), and Pennisetum setosum (feathery pennisetum) appear or increase in abundance. The only vine found in the undisturbed Prosopis forest was Solanum seaforthianum which was present in small quantities. In the watercourse with or without a canopy of Prosopis, Panicum maximum (Guinea grass) and Brachiaria mutica (California grass) dominate the ground cover.

The only native species recorded in the community during the present survey were Plumbago zeylanica, a small herb uncommon on the forest floor, and small amounts of Cassytha filiformis and Ipomoea indica (koali). The introduced species dominate and structure this community, and most native species are apparently unable to survive or thrive in it.

Ruderal Areas. This heterogeneous plant community is found on disturbed places which are dominated by "weeds" and other introduced species. The only exceptions at the study site were Waltheria indica (uha-loa), Solanum nigrum (popolo), and Ipomoea cairica (koali'ai), and there is some question if even these are truly indigenous rather than introduced. This is the most floristically diverse of the communities with over 40 different species recorded during the 1984 site visits.

At the study site, the ruderal areas include most of Oneula Beach Park, two privately owned recreational areas (Del Monte Park and Alii's Park), two poultry farms, a piggery, several small homes, waste areas and roadsides, clearings, and the watercourse running through the parcel.

Cane Fields. Sugar cane (Saccharum officinarum) is cultivated on the north half of the parcel, over an area similar in size to that covered by Prosopis forest. Along the cane roads and watercourses many herbaceous species thrive. These species are essentially the same as found in ruderal areas--weeds. Thus, for the purposes of this study, the cane fields and ruderal areas are combined together on the checklist of the flora of the site



(Table 5-10). Only one species regarded as native was found in the cane fields, and this one, Ipomoea cairica, is questionably indigenous as was mentioned above.

### 5.7.2 Flora

During the five visits to the site in 1984, a total of 85 native, naturalized, and weedy species were recorded (Table 5-10). In addition, Char (1980) recorded about 26 other species which were probably found in the area comprising Increment II. About a third of these 26 are escaped ornamentals, another third are weeds, and another third (seven) are native species. The seven native species previously recorded by Char are as follows:

<u>Heliotropium anomalum</u> H. & A.	Hinahina	Boraginaceae
<u>Cuscuta sandwichiana</u> Choisy	Kauna'oa	Convolvulaceae
<u>Sicyos microcarpus</u> Mann	Kupala	Cucurbitaceae
<u>Canavalia</u> sp.	-----	Leguminosae
<u>Erythrina sandwicensis</u> Deg.	Wiliwili	Leguminosae
<u>Santalum ellipticum</u> Gaud.	Sandalwood	Santalaceae
<u>Tribulus cistoides</u> L.	Nohu	Zygophyllaceae

The number of native species collected during the 1984 survey and the earlier one by Char total 24. Of the 24, five species (one of them at the varietal level) are endemic to Hawaii. These are Erythrina sandwicensis, Santalum ellipticum, Sicyos microcarpus, Cuscuta sandwichiana, and Myoporum sandwicense var. stellatum. The status of the unidentified Canavalia species could not be determined because both native and introduced species of this genus occur in Hawaii.

Of the endemic species, only one, Myoporum, was found during the 1984 survey. In the 1980 report, Char noted all five of the endemic species or varieties to be rare. It is likely that the 1984 drought and/or the hurricane that affected this coast in 1983 may have eliminated the few individuals that were recorded there in 1980. During the 1984 survey, two saplings of what is believed to be Erythrina variegata were found, but at their young age they are difficult to distinguish from the native Erythrina sandwicense (wiliwili).

Rare and Endangered Species. In the 1979 botanical survey of the Ewa Plains, Char and Balakrishnan reported that eight species on the Federal Register of proposed threatened and endangered species list (1976) were historically known from the Ewa Plains. During their survey, only three of these, Euphorbia skottsbergii, Gossypium sandwicense, and Achyranthes splendens var. rotundata, were found in the study area for the proposed Ewa Marina Community. Char (1980) found none of them in the proposed development site.

In previous studies and discussions on the rare and endangered species, three other species, Ophioglossum concinnum, Marsilea villosa, and Eragrostis paupera were indicated to possibly occur on the site. These would not be evident during the dry season. All three are known to appear in their native habitats after heavy rain. It is unlikely that the three species would be



TABLE 5-10

CHECKLIST OF FLORA OF THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II  
FROM WHISTLER, 1984

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS	LS	BS	PS	PF	DA
MONOCOTYLEDONAE							
CYPERACEAE							
<u>Cyperus rotundus</u> L.	Nut grass	X	-	-	-	-	c
<u>Scirpus paludosus</u> A. Nels.	Makai	I?	-	c	-	-	-
GRAMINEAE							
<u>Brachiaria mutica</u> (Forsk.) Stapf	California grass	X	-	-	-	-	a
<u>Cenchrus echinatus</u> L.	Common sandbur	X	u	-	-	-	-
<u>Chloris inflata</u> Link	Swollen fingergrass	X	-	-	-	-	a
<u>Chloris radiata</u> (L.) Sw.	Radiate fingergrass	X	-	-	-	-	u
<u>Cynodon dactylon</u> (L.) Pers.	Bermuda grass	X	c	-	-	-	-
<u>Dactyloctenium aegyptium</u> (L.) Willd.	Beach wiregrass	X	r	-	-	-	-
<u>Eleusine indica</u> (L.) Gaertn.	Goosegrass	X	-	-	-	-	c
<u>Leptochloa uninervia</u> (Pres.) Hitch. & Chase	-----	X	-	-	-	-	o
<u>Panicum maximum</u> Jacq.	Guinea grass	X	-	-	-	u	a
<u>Pennisetum setosum</u> (Sw.) L.C.Rich.	Feathery pennisetum	X	o	-	-	o	a
<u>Saccharum officinarum</u> L.	Sugarcane	P	-	-	-	-	a
<u>Setaria verticillata</u> (L.) Beauv.	Bristly foxtail	X	-	-	-	o	c
<u>Sporobolus virginicus</u> (L.) Kunth	Beach dropseed ( 'aki 'aki )	I	a	u	-	-	-
<u>Tricachne insularis</u> (L.) Nees	Sourgrass	X	-	-	-	-	u
DICOTYLEDONAE							
ACANTHACEAE							
<u>Asystasia gangetica</u> (L.) T. Anders	Chinese violet	X	-	-	-	a	a
AIZOACEAE							
<u>Sesuvium portulacastrum</u> (L.) L.	'akulikuli	I	a	-	-	-	-
AMARANTHACEAE							
<u>Achyranthes indica</u> (L.) Mill.	-----	X	-	-	-	c	o
<u>Altenanthera repens</u> (L.) O. Ktze.	Khaki weed	X	u	-	-	-	u
<u>Amaranthus gracilis</u> Desf.	Slender amaranth	X	-	-	-	-	o
<u>Amaranthus spinosus</u> L.	Spiny amaranth	X	-	-	-	-	o
ANACARDIACEAE							
<u>Schinus terebinthifolius</u> Raddi	Christmas berry	X	-	-	-	u	o
ARALIACEAE							
<u>Brassaia actinophylla</u> Endl.	Umbrella tree	X	-	-	-	r	-

TABLE 5-10  
(continuation)

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS	LS	BS	PS	PF	DA
<b>BATIDACEAE</b>							
<u>Batis</u> <u>maritima</u> L.	Pickleweed	X	c	a	-	-	-
<b>BORAGINACEAE</b>							
<u>Cordia</u> <u>subcordata</u> Lam.	Kou	P	-	-	r	-	-
<u>Heliotropium</u> <u>curassavicum</u> L.	<u>Hinahina</u>	I?	o	u	-	-	-
<b>CAPPARIDACEAE</b>							
<u>Gynandropsis</u> <u>gynandra</u> (L.) Briq.	Spider flower	X	-	-	-	-	c
<b>CHENPODIACEAE</b>							
<u>Atriplex</u> <u>muelleri</u> Benth.	----	X	c	-	-	-	o
<u>Atriplex</u> <u>semibaccata</u> R. Br.	Australian saltbush	X	a	-	-	-	c
<u>Chenopodium</u> <u>murale</u> L.	Nettle-leaved goosefoot	X	o	-	-	-	c
<b>COMPOSITAE</b>							
<u>Bidens</u> <u>cynapifolia</u> HBK.	West Indian beggar's tick	X	-	-	-	u	-
<u>Bidens</u> <u>pilosa</u> L.	Beggar's tick	X	-	-	-	-	o
<u>Calyptocarpus</u> <u>vialis</u> Less.?	-----	X	-	-	-	-	u
<u>Erigeron</u> <u>canadensis</u> L.	Canada fleabane	X	-	-	-	-	o
<u>Franseria</u> <u>strigulosa</u> Rydb.	False ragweed	X	u	-	-	-	-
<u>Pluchea</u> x <u>fosbergii</u> Cooper.	Hybrid pluchea	X	-	-	u	-	o
<u>Pluchea</u> <u>indica</u> (L.) Less.	Indian pluchea	X	-	o	a	u	o
<u>Pluchea</u> <u>odorata</u> (L.) Cass.	Pluchea	X	-	o	a	u	o
<u>Reichardia</u> <u>picroides</u> (L.) Roth	Picridium	X	u	-	-	-	-
<u>Sonchus</u> <u>oleraceus</u> L.	Sow thistle	X	-	-	-	u	o
<u>Verbesina</u> <u>encelioides</u> (Cav.) A. Gray	Golden crown-beard	X	c	-	-	-	a
<b>CONVOLVULACEAE</b>							
<u>Ipomoea</u> <u>alba</u> L.	Moon flower	X	-	-	-	o	c
<u>Ipomoea</u> <u>cairica</u> (L.) Sweet	Koali'ai	I?	-	-	-	-	o
<u>Ipomoea</u> <u>indica</u> (Burm.) Merr.	Koali'awa	I	-	-	c	-	o
<u>Ipomoea</u> <u>pes-caprae</u> (L.) R. Br.	Pohuehue	I	u	-	-	-	-
<u>Ipomoea</u> <u>obscura</u> (L.) Ker-Gawl	-----	X	-	-	-	-	o
<u>Ipomoea</u> <u>triloba</u> L.	Little bell	X	-	-	-	-	o
<u>Merremia</u> <u>aegyptia</u> (L.) Urb.	Hairy merremia	X	-	-	-	-	o
<b>CUCURBITACEAE</b>							
<u>Curcubita</u> <u>pepo</u> L.	Pumpkin	X	-	-	-	-	r
<u>Momordica</u> <u>charantia</u> L.	Balsam apple	X	-	-	-	-	o



TABLE 5-10  
(continuation)

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS	LS	BS	PS	PF	DA
<b>EUPHORBIACEAE</b>							
<u>Euphorbia geniculata</u> Ortega	Wild spurge	X	-	-	-	-	c
<u>Euphorbia glomerifera</u> (Millsp.) L. C. Wheeler	-----	X	-	-	-	-	o
<u>Euphorbia cyathophora</u> (Murr.) Griesb.	Mexican fire plant	X	-	-	-	-	o
<u>Euphorbia hirta</u> L.	Hairy spurge	X	-	-	-	-	o
<u>Euphorbia prostrata</u> Ait.	Prostrate spurge		-	-	-	-	o
<u>Ricinus communis</u> L.	Castor bean	X	-	-	+	-	o
<b>GOODENIACEAE</b>							
<u>Scaevola taccada</u> (Gaertn.) Roxb.	Naupaka	I	o	-	-	-	-
<b>LABIATAE</b>							
<u>Leonotus nepetaefolia</u> (L.) Ait. f.	Lion's ear	X	-	-	-	-	c
<b>LAURACEAE</b>							
<u>Cassytha filiformis</u> L.	Kauna'oa-pehu	I	-	c	a	o	-
<b>LEGUMINOSAE</b>							
<u>Acacia farnesiana</u> (L.) Willd.	Klu	X	-	-	u	-	-
<u>Crotalaria incana</u> L.	Fuzzy rattlepod	X	-	-	-	-	o
<u>Desmanthus virgatus</u> (L.) Willd.	Virgate mimosa	X	-	-	-	-	o
<u>Erythrina variegata</u> L.	Wiliwili haole	X	-	-	-	r	-
<u>Leucaena leucocephala</u> (Lam.) de Wit	Koa haole	X	o	-	a	a	c
<u>Prosopis pallida</u> (Willd.) HBK.	Kiawe	X	-	-	a	a	-
<b>MALVACEAE</b>							
<u>Abutilon grandifolium</u> (Willd.) Sweet	Hairy abutilon	X	-	-	-	u	o
<u>Malva parviflora</u> L.	Cheeseweed	X	-	-	-	-	c
<u>Malvastrum coromandelianum</u> (L.) Garcke	False mallow	X	-	-	-	o	c
<u>Sida fallax</u> Wallp.	'Ilima	I	u	-	-	-	-
<u>Sida spinosa</u> L.	Prickly sida	X	-	-	-	-	u
<u>Thespesia populnea</u> (L.) Correa	Milo	P	-	-	o	-	-
<b>MYOPORACEAE</b>							
<u>Myoporum sandwicense</u> A. Gray	Naio	I	-	-	o	-	-
<b>MYRTACEAE</b>							
<u>Syzygium cumini</u> (L.) Skeels	Java plum	X	-	-	-	r	-
<b>NYCTAGINACEAE</b>							
<u>Boerhavia repens</u> L.	Alena	I	c	-	-	-	-
<u>Boerhavia tetrandra</u> Forst.	Alena	X	u	-	-	-	o

TABLE 5-10  
(continuation)

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS	LS	BS	PS	PF	DA
PASSIFLORACEAE							
<u>Passiflora foetida</u> L.	Wild passionfruit	X	-	-	-	u	o
PLUMBAGINACEAE							
<u>Plumbago zeylanica</u> L.	'Ilie'e	I?	-	-	-	u	-
PORTULACACEAE							
<u>Portulaca oleracea</u> L.	Pigweed	X	u	-	-	-	o
SOLANACEAE							
<u>Lycium sandwicense</u> A. Gray	'Ohelo-kai	I	c	-	-	-	-
<u>Nicandra physalodes</u> (L.) Gaertn.	Apple of Peru	X	-	-	-	-	r
<u>Solanum nigrum</u> L.	Popolo	I?	-	-	-	u	-
<u>Solanum seaforthianum</u> Andr.	-----	X	-	-	-	o	-
STERCULIACEAE							
<u>Waltheria indica</u> L.	Uha-loa	I?	u	-	-	-	o
ZYGOPHYLLACEAE							
<u>Tribulus terrestris</u> L.	Puncture vine	X	r	-	-	-	c

LS = Littoral strand; BS = Batis swamp; PS = Pluchea shrub;  
 PF = Prosopis forest; and DA = Disturbed areas (including canefields).  
 r = rare; u = uncommon; o = occasional; c = common; and a = abundant.  
 I = Indigenous (native); E = Endemic; X = Exotic (introduced);  
 P = Polynesian Introduction



found at the study site (even after heavy rains) because of the unsuitability of the habitat or vegetation occurring on the site at the present time.

Another four of the species recorded at the site are on a list of rare and endangered plants in Hawaii prepared by Fosberg and Herbst (1975)--Heliotropium anomalum, Heliotropium curassavicum, Santalum ellipticum, and Lycium sandwicense. While not officially listed as "rare and endangered" species by the Federal Register, these are much less common than they formerly were, mostly due to human disturbance of their native habitats.

### 5.7.3 Fauna

Because there are no mammals other than the Hawaiian bat and the monk seal, and no reptiles other than turtles native to Hawaii, birds are the major faunal concern at the proposed development site. The area originally had a bird fauna consisting of many endemic species. However, since the arrival of man, the avifauna in the area has been greatly depleted either directly by killing of the birds, or indirectly by habitat modification. The original sclerophyllous forest dominated by Erythrina sandwicense and Santalum ellipticum has been eliminated from the site and along with it the associated endemic birds and most of the indigenous ones as well.

A list of all the birds known to occur at the site is found in Table 5-11. It includes 24 species, only five of which are indigenous, and none of them endemic. Sixteen of these birds were recorded by Berger (1979) in a study of the West Beach area. In the Supplemental EIS for Increment I of Ewa Marina Community (1984), another five were included on the avifauna checklist, with three others listed as "probably present". During the 1984 field work for Increment II, two of the birds listed as "probably present" were confirmed, and one additional species was added. The now-confirmed two are the Black-crowned Night Heron (Bert Davis, pers. comm.) and the Barn Owl (a single sick or injured individual was found in the Pluchea scrub thicket surrounding the Batis swamp). The new species added to the checklist is the Peafowl (Char, pers. comm.).

Of the five indigenous species, four of them, the American Golden Plover, the Wandering Tattler, the Ruddy Turnstone, and the Sanderling are migratory birds which spend the winter in Hawaii and migrate in the spring to the north temperate regions where they breed. The other species, the Black-crowned Night Heron, is an indigenous resident species.

The most common birds at the site are the Japanese White-eye, the Barred Dove, the Cardinal, and the House Finch. All of these birds are exotics and are common throughout much of Oahu.

Only three species of mammals have been recorded from the site--the house mouse, the domestic dog, and the small Indian mongoose (Table 5-12). Three other species, the roof rat, the Norway rat, and the Polynesian rat, although not actually recorded at the site, are in all probability found there because of the suitability of habitat. All of these species are exotic.

Three species of reptiles are recorded from the site, all of them exotic lizards (Table 5-12). Additionally, another lizard species (the mourning

TABLE 5-11

CHECKLIST OF BIRDS OF THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS
ARDEIDAE		
<u>Bulbucus ibis</u>	Cattle Egret	X R
<u>Nycticorax nycticorax</u> <u>hoactli</u>	Black-crowned Night Heron ('Auku'u)	I R
CHARADRIIDAE		
<u>Pluvialis dominica fulva</u>	American Golden Plover (Kolea)	I M
COLUMBIDAE		
<u>Columba livia</u>	Rock Dove	X R
<u>Geopelia striata</u>	Barred Dove	X R
<u>Zenaida chinensis</u>	Spotted Dove	X R
FRINGILLIDAE		
<u>Cardinalis cardinalis</u>	Cardinal	X R
<u>Carpodacus mexicanus</u>	House Finch	X R
<u>Paroaria coronata</u>	Red-crested Cardinal	X R
PHASIANIDAE		
<u>Pavo cristatus</u>	Peafowl	X R
PLOCEIDAE		
<u>Amandava amandava*</u>	Red Munia	X R
<u>Estrilda melpoda</u>	Orange-cheeked Waxbill	X R
<u>Estrilda troglodytes</u>	Red-eared Waxbill	X R
<u>Lonchura punctulata</u>	Spotted Munia	X R
<u>Lonchura malacca</u>	Black-headed Munia	X R
<u>Passer domesticus</u>	House Sparrow	X R
PYCNONOTIDAE		
<u>Pycnonotus cafer</u>	Red-vented Bulbul	X R
SCOLOPACIDAE		
<u>Arenaria interpres</u>	Ruddy Turnstone ('Akekeke)	I M
<u>Calidris alba</u>	Sanderling (Huna-kai)	I M
<u>Heteroscelus incanus</u>	Wandering Tattler ('Ulili)	I M
STURNIDAE		
<u>Acridotheres tristis</u>	Common Myna	X R
TURDIDAE		
<u>Copsychus malabaricus</u>	Shama Thrush	X R
TYTONIDAE		
<u>Tyto alba</u>	Barn Owl	X R
ZOSTEROPIDAE		
<u>Zosterops japonicus</u>	Japanese White-eye (Mejiro)	X R

I = Indigenous (native)      X = Exotic (introduced)  
 R = Resident                      M = Migratory  
 \* = Presence probable but not confirmed



TABLE 5-12

CHECKLIST OF ANIMALS OF THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II

SCIENTIFIC NAME FAMILY	COMMON NAME	STATUS	PRESENCE
<u>MAMMALS</u>			
MURIDAE			
<u>Rattus rattus rattus</u>	Roof Rat	X	Probable
<u>Rattus norvigicus norvigicus</u>	Norway Rat	X	Probable
<u>Rattus exulans hawaiiensis</u>	Polynesian Rat	X	Probable
<u>Mus domesticus</u>	House Mouse	X	Yes
CANIDAE			
<u>Canis familiaris familiaris</u>	Domestic Dog	X	Yes
VIVERRIDAE			
<u>Herpestes auropunctatus auropunctatus</u>	Small Indian Mongoose	X	Yes
<u>REPTILES</u>			
GEKKONIDAE			
<u>Hemidactylus frenatus</u>	House Gecko	X	Yes
<u>Hemiphyllodactylus typus typus</u>	Tree Gecko	X	Yes
<u>Lepidodactylus lugubris</u>	Mourning Gecko	X	Probable
SCINCIDAE			
<u>Leiopisma metallicum</u>	Metallic skink	X	Yes
<u>AMPHIBIANS</u>			
BUFONIDAE			
<u>Bufo marinus</u>	Giant Neotropical Toad	X	Probable

X = Exotic (introduced)

gecko) and one amphibian (the giant Neotropical toad) are likely to occur there, and both of these are exotic as well.

Rare and Endangered Species. The only native animals found at the site are the five above mentioned indigenous birds, and none of these is classified as rare or endangered. It is possible, however, that the Hawaiian Coot (Fulica americana alai or 'alae-ke'oke'o) and/or the Hawaiian Stilt (Himantopus mexicanus knudseni or ae'o) use the Batis swamp on occasion. These two endemic and endangered birds are attracted to areas of standing water, and although the swamp at the site had little standing water at the time of the survey, during normal rainy seasons the swamp should at least be hospitable to their casual use. Although American Golden Plovers and Black-crowned Night Herons are known to use the Batis swamp, there is no report of the two endemic species doing likewise. There are other more suitable marsh or swamp habitats on Oahu, and the swamp on the site is probably of little or no consequence to them.

## 5.8 MARINE AND SHORELINE ENVIRONMENT

### 5.8.1 Marine Biology

The marine biology of the area between Ewa Beach and the Barbers Point Naval Air Station has been the subject of several studies (e.g., Reed, 1974; Sea Engineering Service, 1978; AECOS, 1979 and 1980).

To augment the existing data base, a biological reconnaissance survey of the Ewa Marina site was undertaken by Dames & Moore in June 1984. This reconnaissance focused on the proposed offshore marina entrance channel route. A prior reconnaissance survey (AECOS, 1980) had a broader focus and included a transect parallel to shore in 3 to 10 feet depths and covering most of the frontage of the project area.

Figure 5-4 shows the approximate locations of the four dive areas examined in the Dames & Moore survey, the three areas and long transect of the AECOS (1980) survey and the proposed location of the offshore portion of the marina entrance channel. This section discusses the benthic marine flora and fauna of the site, based on the two site surveys by AECOS (1980) and Dames & Moore.

The habitat along the proposed marina entrance channel is generally a flat carbonate platform with varying sand cover. At the Dames & Moore offshore location No.1, the platform had little sand cover (10-20 percent) and was characterized by isolated patches of coral 3 to 50 feet apart and 10 to 40 inches in height. This location corresponds to AECOS (1980) Transect III area. Water depths were 30 to 36 feet. Visibility was 30 to 50 feet.

Area No. 2 was in an area of undulating carbonate bottom with the depression filled with sand. Vertical relief and shelter were limited. The sand thickness varied from less than 1/2 inch to more than 6 inches and covered 50 to 75 percent of the bottom. Water depth was 19 to 22 feet. Visibility was restricted 10 to 16 feet.

Area No. 3 was on the west side of the shallow reef which the channel transects. The vertical relief was greater here than at the adjacent stations



# SITE SPECIFIC MARINE BIOLOGICAL DIVE STATIONS

EWA MARINA COMMUNITY

LEGEND: (ALL LOCATIONS APPROXIMATE)

II

AECOS DIVE AREAS, 1980

I

AECOS LONG TRANSECT, 1980

2

DAMES & MOORE DIVE AREAS, 1984

4

DAMES & MOORE SHOREWARD TRANSECT, 1984

500 0 500 1000 1500  
FEET

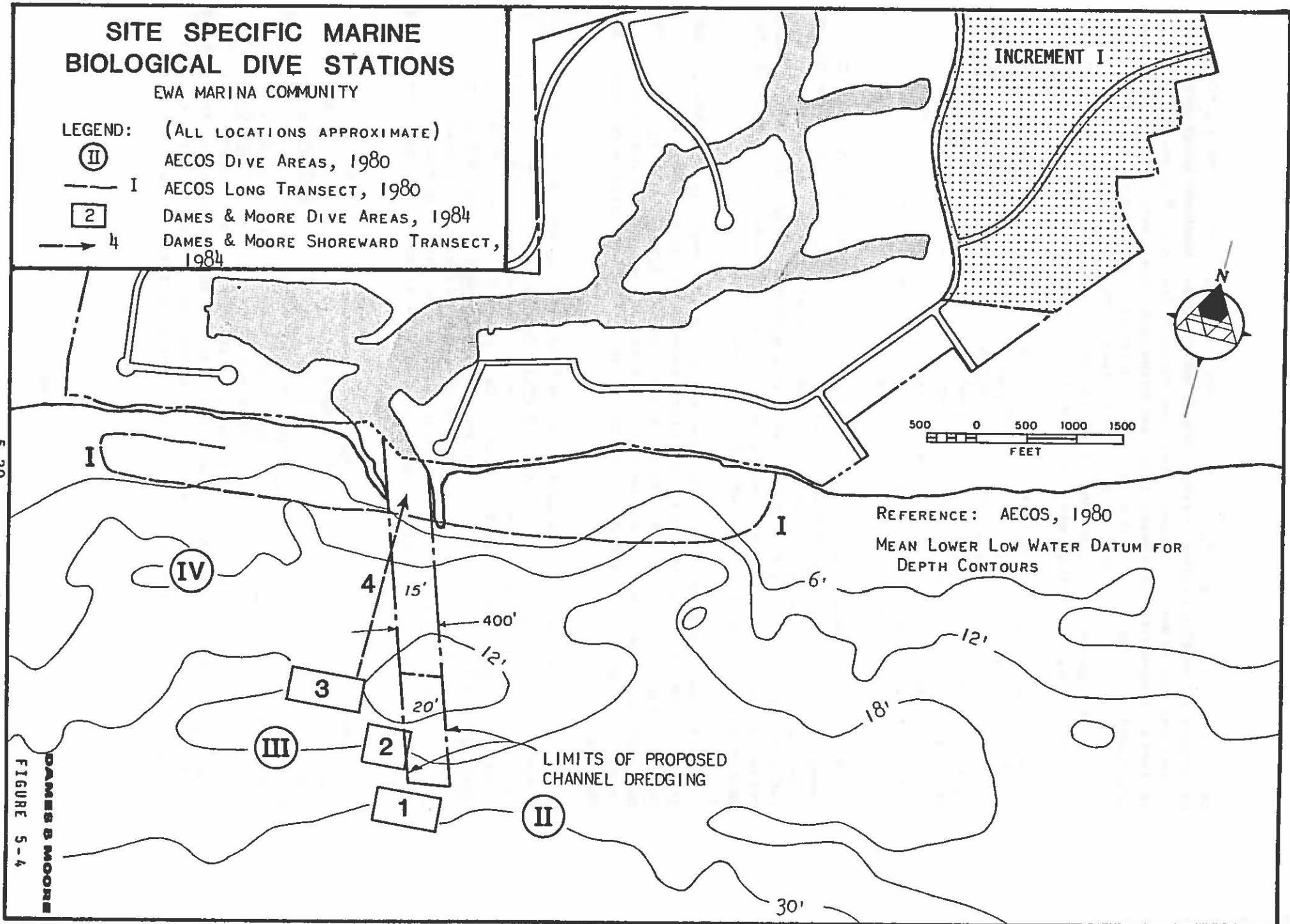
REFERENCE: AECOS, 1980

MEAN LOWER LOW WATER DATUM FOR  
DEPTH CONTOURS

LIMITS OF PROPOSED  
CHANNEL DREDGING

5-29

DAMES & MOORE  
FIGURE 5-4



both seaward and shoreward, and the bottoms of depressions in the platform were usually rubble filled, rather than sand filled. Maximum local vertical relief was the order of 3 feet. Average depth during the dive was 15 to 18 feet. Proceeding shoreward from the anchorage, the water depth initially decreased and then increased again. The depth also decreased toward the east. Visibility averaged about 20 to 25 feet. The description of the habitat at Transect IV in AECOS (1980) is similar to this station, but it is apparently located further west and inshore of Dames & Moore Area No. 3.

Area No. 4 was inshore from Area No. 3, and extended into a water depth of about 6 feet, to within about 350 feet of shore. Sand cover increased rapidly toward shore from about 15 feet depths where it was about 50 percent. In 10 feet depths and in to shore the sand cover was 80 to 90 percent and generally 2 to 8 inches thick. Visibility decreased with increasing sand cover and decreasing depth. Near shore (water depth less than 10 feet) visibility was generally less than 3 feet. This area is comparable to the center of Transect I of the AECOS (1980) survey.

Flora. The marine algae of the site area are abundant and varied. The Dames & Moore survey reported 40 taxa from the four major benthic algae phyla (Table 5-13). Red algae (Rhodophyta) were the most speciose group (25 taxa) but green and brown algae were also well represented. This distribution among phyla is similar to that reported by AECOS (1980) who also report many of the same species in their list of 24 subtidal taxa.

Algae cover (10 to 20 percent) and variety were lowest at the seawardmost station (Area No. 1). Unidentified fine filamentous algae (possibly Ceramium spp; see AECOS, 1980) and the green algae Neomeris annulata were the most common. The presence of cover for grazing fishes may account for the relatively low variety and cover of macroalgae. Grazing marks were common on the rocks.

Algae cover (20 to 50 percent) and variety were highest at Area No. 2. Dense stands of the brown algae Dictyopteris australis dominated the algal cover (5 to 15 percent). Also abundant were the green algae Codium edule, Neomeris annulata, and Ulva fasciata (1 to 5 percent) and the red algae Asperogopsis taxiformis (1 to 5 percent), Liagora maxima and encrusting coralline species. There was a minimum of cover available for grazing fishes. Light penetration was sufficient to support algal growth and the depth was sufficient to allow species susceptible to scour and surge to become established.

At Area No. 3, algae cover dropped to about 15 to 25 percent, but there was greater variety and much greater representation by larger algal species than at the seaward station (Area No. 1). The green algae Codium edule, Halimeda discoidea and H. opuntia were common. Also observed were the conical red algal species Asperogopsis taxiformis and Wrangelia penicillata, encrusting and branching coralline algae and the red algae Liagora maxima, Hypnea cervicornis and Halymenia formosa. With depth (and resultant surge) about equivalent to Area No. 2, and with better light penetration, the reduced algal cover and variety over that site are probably a result of the greater density of grazing fish and the relatively high density of sea urchins.



TABLE 5-13

CHECKLIST OF MARINE ALGAE OF THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II

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CHLOROPHYTA (GREEN ALGAE)

cf. Bornetella sphaerica  
Caulerpa taxifolia  
Caulerpa sp nr racemosa  
Codium arabicum  
Codium edule  
Codium reediae  
Halimeda discoidea  
Halimeda opuntia  
Neomeris annulata  
Ulva fasciata

CYANOPHYTA (BLUEGREEN ALGAE)

Hormothamnion enteromorphoides

PHAEOPHYTA (BROWN ALGAE)

Dictopteris australis  
Dictyota divaricata  
Lobophora variegata  
Padina cf. japonica

RHODOPHYTA (RED ALGAE)

Acanthophora spicifera  
cf. Actinotrichia fragilis  
Asperogopsis taxiformis  
cf. Coelothrix irregularis  
Corallina sp  
Galaxaura fastigiata  
Gracilaria bursapastoris  
Gracilaria coronopifolia  
Grateloupia filicina  
Halymenia formosa  
Hypnea cervicornis  
Hypnea chordacea  
Hydrolithon cf. breviclavum  
Jania spp  
Laurencia cf. succisa  
Liagora maxima  
Martensia fragilis  
Neogoniolithon cf. frutescens  
Plocamium sandvicense  
Porolithon onkodes  
Pterocladia sp  
Scinaia hormoides  
Sphyridia filamentosa  
Trichoglea requienii  
Wranglia penicellata

Source: DAMES & MOORE field survey June 13, 1984.

Algal cover continued to decrease toward shore in Area No. 4. Green algae, especially Codium edule, Halimeda discoidea, H. opuntia and Ulva cf. fasciata, were common in depths of 15 to 10 feet. The species distribution overall was similar to, but with lower densities than Area No. 2. As with the AECOS (1980) survey, the red algae Hypnea cervicornis, Acanthophora spicifera and Coelothrix irregularis were also recorded from this sand-inundated habitat. The balance of reduced cover for grazing fishes, much lower sea urchin densities but higher scour and lower light penetration (as well as less exposed rock substrate) would appear to account for the moderately high variety and modest algal density in this area.

**Fauna.** The benthic macrofauna of the survey area is generally impoverished. Live coral cover decreases from offshore to onshore, but is not dominant over any of the habitats surveyed. Fish density and variety both were directly related to availability of cover with highest counts at Areas No. 3 and 1. However, both of these areas were considered to be depauperate and there was no evidence that the area might serve as a nursery for juvenile fish (Losey, 1984). Sea urchins were the only other macrofaunal group which were common in the area, and they were abundant only at Area No. 3. Invertebrates identified during this survey are listed in Table 5-14. Fish species are listed in Table 5-15.

Live coral coverage at Area No. 1 site was 12 to 20 percent overall. Nearly all of the coral was Porites lobata. Where patches of coral heads were situated in close proximity (0 to 6 feet), live coral coverage exceeded 25 percent and was locally dominant. Other coral species observed in this habitat were Montipora patula, M. verrucosa and Pavona varians. Coral associated crabs (Maldivia triunguiculata) and shrimp (Alpheus deuteropus) were common in the P. lobata colonies. Zoanthids, sponges (at least 4 species), sabellid worms and sea urchins were also present.

Fish density was estimated to average 50 per 100 square yards and not to exceed 200 per 100 square yards (Losey, 1984). The large schools of herbivores typical of Hawaiian reefs were not observed. Areas of local shelter were dominated by territorial herbivores including the surgeonfish Acanthurus nigrofuscus and the damselfish Stegastes fasciolatus. Some coral heads were dominated by large Dascyllus albisella, a damselfish. The most conspicuous fish species was the surgeonfish Acanthurus olivaceus. On the open flat carbonate bench small wrasses were most abundant, especially Thalassoma duperry.

At Area No. 2, live coral cover was less than 1 percent overall with about 1 colony per 10 square yards. Colonies were small and consisted of Porites lobata and Pocillopora meandrina. Dense aggregation of the mussel Branchidontes crebristriatus formed patches of 10 to 13 feet diameter and covered 50 to 75 percent of the area within a patch. This would yield densities on the order of 10,000 per square yard. AECOS (1980) also reports on the high abundance of this mussel at this location. Other conspicuous invertebrates observed included sea urchins (Echinometra mathaei, Echinothrix diadema and Tripneustes gratilla) in low density, the black sponge Iotrochota protea, the alcyonarian Anthelia edmondsoni and the large sea cucumber Holothuria atra.



TABLE 5-14

CHECKLIST OF CONSPICUOUS MACROINVERTEBRATES OF THE  
PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II

PORIFERA (SPONGES)

Cliona vastifica  
Haliclona permolis  
Iotrochata protea  
Unidentified sponges  
(4 other noted species)

CNIDARIA (CORALS, ANEMONES,  
JELLYFISH AND HYDROIDS)

ALCYONARIA (SEA FANS)

Anthelia edmondsoni

ZOOANTHERIA (SOFT CORALS)

Palythoa tuberculosa

Zoanthus pacificus

SCLERACTINIA (HARD CORALS)

Montipora patula

Montipora verrucosa

Pavona varians

Pocillopora damicornis

Pocillopora ligulata

Pocillopora meandrina

Porites compressa

Porites lobata

Psammocora stellata

MOLLUSCA (CLAMS, SNAILS,  
CHITONS AND OCTOPUS)

GASTROPODA (SNAILS)

Cypraea cf. moneta

Cypraea sp

PELECYPODA (CLAMS)

Brachidontes crebristriatus

ANNELIDA (SEGMENTED WORMS)

POLYCHAETA (MARINE WORMS)

Cirratulidae unid.

Sabellidae unid.

Serpulidae unid.

ARTHROPODA/CRUSTACEA (CRABS,  
BARNACLES, AND MYSIDS)

DECAPODA (CRABS, SHRIMP

AND LOBSTER)

Alpheus deuteropus

Maldivia triunquiculata

Stenopus hispidis

Xanthidae unid.

ECHINODERMATA (STARFISH, URCHINS  
AND CUCUMBERS)

ECHINOIDEA (SEA URCHINS)

Diadema sp

Echinometra mathaei

Echinothrix diadema

Tripneustes gratilla

HOLOTHUROIDEA (SEA CUCUMBERS)

Holothuria atra

OPHIUROIDEA (BRITTLE STARS)

Unidentified ophiuroids

(2 noted species)

Source: DAMES & MOORE, 1984.

TABLE 5-15

CHECKLIST OF  
FISHES OBSERVED AT THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II

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<u>Acanthurus</u> <u>mata</u>	<u>Dascyllus</u> <u>albisella</u>
<u>Acanthurus</u> <u>nigrofuscus</u>	<u>Diodon</u> <u>hystrix</u>
<u>Acanthurus</u> <u>nigroris</u>	<u>Forcipiger</u> <u>flavissimus</u>
<u>Acanthurus</u> <u>olivaceus</u>	<u>Labroides</u> <u>phthirophagus</u>
<u>Acanthurus</u> <u>triostegus</u>	<u>Macropharyngodon</u> <u>geoffrey</u>
<u>Arothron</u> <u>meleagris</u>	<u>Melichthyes</u> <u>niger</u>
<u>Aulostomus</u> <u>chinensis</u>	<u>Naso</u> <u>lituratus</u>
<u>Canthigaster</u> <u>amboinensis</u>	<u>Naso</u> <u>unicornis</u>
<u>Canthigaster</u> <u>coronata</u>	<u>Novaculichthys</u> <u>taeniourus</u>
<u>Canthigaster</u> <u>jactator</u>	<u>Ostracion</u> <u>meleagris</u>
<u>Caranx</u> <u>sp</u>	<u>Paracirrhitis</u> <u>forsteri</u>
<u>Chaetodon</u> <u>fremblii</u>	<u>Parupeneus</u> <u>multifasciatus</u>
<u>Chaetodon</u> <u>kleinii?</u>	<u>Parupeneus</u> <u>porphyreus</u>
<u>Chaetodon</u> <u>lulula</u>	<u>Pervagor</u> <u>spilosoma</u>
<u>Chaetodon</u> <u>miliaris</u>	<u>Plectoglyphidodon</u> <u>imparipinnis</u>
<u>Chaetodon</u> <u>multicinctus</u>	<u>Rhinecanthus</u> <u>aculeatus</u>
<u>Chaetodon</u> <u>ornatissimus</u>	<u>Rhinecanthus</u> <u>rectangulatus</u>
<u>Chaetodon</u> <u>quadrifasciatus</u>	<u>Scarus</u> <u>sp</u>
<u>Cheilinus</u> <u>sp</u>	<u>Stegastes</u> <u>fasciolatus</u>
<u>Chromis</u> <u>vanderbilti</u>	<u>Stethojulis</u> <u>sp</u>
<u>Coris</u> <u>flavovittata</u>	<u>Sufflamen</u> <u>frenatus</u>
<u>Coris</u> <u>gaimard</u>	<u>Thalassoma</u> <u>duperry</u>
<u>Coris</u> <u>venusta</u>	<u>Thalassoma</u> <u>fuscum</u>
<u>Ctenochaetus</u> <u>strigosus</u>	<u>Zanclus</u> <u>cornutus</u>

Source: Losey, 1984; Dames & Moore field survey.



Fish density and species variety were very poor. Density was estimated at less than 5 fish per 100 square yards (Losey, 1984). While a total of 20 species was observed over a 21-minute observation period, nearly half of these were observed at a single isolated rubble pile which offered some degree of shelter.

The high turbidity and relatively complete inundation of this habitat by sand account for the low coral cover. Its lack of vertical relief and associated shelter account for the poor fish populations.

At Area No. 3, live coral cover was 5 to 15 percent, and species variety was the highest observed. Coral species recorded from this site included Montipora patula, M. verrucosa, Pocillopora damicornis, P. ligulata, P. meandrina, Porites compressa, P. lobata and Psammocora stellata. Of these, Porites lobata and Pocillopora meandrina were the most common, with Porites compressa also common. The colonies of Porites lobata were generally encrusting, with little elevation. Colonies of Pocillopora meandrina were of a wide range of sizes up to 1 foot in diameter. Pocillopora damicornis would normally be expected in a shallower habitat.

Sea urchins were abundant at this site. The burrowing urchin Echinometra mathaei was locally abundant reaching densities of more than 20 per square yard and averaging 1-2 per square yard. The short-spined urchin Tripneustes gratilla was present throughout the area on the open carbonate bottom. It had local densities of 2-5 per square yard and averaged about 1 individual per two square yards. Also common was the nestling Echinothrix diadema (about 1 per 10 square yards).

The coral rubble in the depressions and cracks of the bench provided shelter for such cryptic invertebrates as cowries, grapsid and xanthid crabs, snapping shrimps, polychaetes and brittle stars. Other conspicuous epifauna included zoanthids (Palythoa tuberculosa and Zoanthus pacificus), the alcyonarian Anthelia edmondsoni and several species of sponges.

Fish density and variety were similar to Area No. 1 location, although schools of up to 40 individuals of herbivorous fish were observed here. In all, 35 species were recorded in this area. Mixed schools of surgeon fish were common, composed primarily of Acanthurus triostegus and with A. olivaceus and A. mata joining in. Areas of shelter were dominated by territorial species such as A. nigrofuscus and Stegastes fasciolatus. Higher fish densities were associated with the greater surface relief toward the reef on the east of the dive area (Figure 5-4).

Coral cover diminished rapidly to less than 1 percent moving shoreward from Area No. 3. Small colonies of Porites lobata, Pocillopora meandrina and Psammocora stellata were observed into depths of about 10 feet. Large patches of the mussel Brachidontes crebristriatus such as seen at Area No. 2 site were also observed here in the 10 to 13 feet depth zone of extensive sand cover. The large sea cucumber Holothuria atra was observed as well. Fish densities also decreased toward shore in 16 to 6 foot depths. Density over the shallow area was estimated at less than 5 fish per 100 square yards. The surgeonfish Acanthurus triostegus and triggerfish Rhinecanthus spp. were observed in this area.



Occurrence of the endemic shrimp, Halocaridina rubra, has been reported in a shallow "well" on the project site. Confirmation of the presence or absence of this species will be coordinated with the Fish and Wildlife Service and reported in the Corps of Engineers EIS for the Ewa Marina Community.

Threatened and Endangered Species. The following are threatened or endangered species that could be found in waters around the Hawaiian Islands: the endangered monk seal (Monachus schauinslandi), the endangered humpback whale (Magaptera novaeangliae), the threatened green turtle (Chelonia mydas), and, to a lesser extent, the hawksbill (Eretmochelys imbricata), loggerhead (Caretta caretta) and Pacific Ridley (Lepidochelys olivacea) turtles.

Summary of Benthic Marine Ecology. The habitats observed in the vicinity of the proposed marina entrance channel have limited vertical relief and shelter. In addition, nearly all the area shoreward of the 13 foot contour and considerable portions of the area seaward of the small rise through which the proposed entrance channel passes are inundated by sand. These two factors combine to produce a benthic environment which is relatively more supportive of marine algae than typical leeward reefs on Oahu, and relatively poor in coral cover and variety, and reef fish density and variety.

#### 5.8.2 Physical Processes

Winds. Open ocean winds around the Hawaiian Islands are dominated by the northeast trades. Wind data from the adjacent Barbers Point Naval Air Station shows 85 percent of the winds from the northeast quadrant with an average speed of 9 knots.

Tides. Tides in Hawaii are semi-diurnal with a diurnal inequality. The average tidal range in Honolulu Harbor (the nearest gaging station) is 1.9 feet, with a mean sea level 0.81 feet above mean lower low water. The maximum annual tidal range is approximately 3 feet with the highest recorded tide 3.2 feet above mean lower low water. Water level fluctuations can also be produced by storm surge and wave set up. Storm surge is a relatively minor factor in Hawaiian waters due to the steeply sloping bathymetry offshore. Wave setup is due to the shoreward transport of water in breaking waves causing increased water depth and higher waves than expected in the near shore zone.

Currents. Current studies carried out in Mamala Bay in conjunction with studies of the Honouliuli sewer outfall are applicable to the area offshore of the project (R. M. Towill, 1975). The general flow of water in the western half of Mamala Bay is from east to southwest. The combination of general flow across Mamala Bay with tidal effects produces reversing currents with a net southwest set, with a tendency to follow bathymetric contours. Flood tides enter Mamala Bay both from the east around Diamond Head and from the west around Barbers Point. These two flows appear to meet off Ewa Beach. From May to November the area of convergence is off Oneula Beach Park. Between December and April, the convergence is perhaps farther east off of Ewa Beach town. Flow direction at the convergence is controlled by tidal phase, with general west to southwestward offshore flow during ebb tides and general southeast to southward flow during flood tides. These patterns are affected by wind conditions. The pattern described above applies to tradewind periods. Southerly Kona storms and winds would be expected to produce a stronger onshore component.



Wave Climate. The proposed project site is located on a shoreline with a general trend on an azimuth of 75 degrees, and is directly exposed to waves generated from east clockwise through 255 degrees. The south-southeasterly facing shoreline is exposed to the local tradewinds and associated waves, hence the wave climate offshore from Pearl Harbor to Barbers Point is rougher than between Pearl Harbor and Diamond Head. This subtle change in shoreline and protection relative to predominant tradewinds and waves renders waters off the project area somewhat choppy than at other marinas on the south shore of Oahu.

Tsunamis. Tsunamis are produced by various submarine coastal disturbances such as volcanic activity, submarine landslides, and sudden fault movements that displace large quantities of water. Tsunami waves are characterized by their long period (between 12 and 20 minutes with an average period of 15 minutes) and their rapid speed over the open ocean. Their speed approaches 460 miles per hour and their arrival times in Hawaii vary from 5 hours for an Aleutian source to 15 hours for a Chilean source.

Fifteen of eighty-five tsunamis that have been observed in Hawaii since 1813 have resulted in significant damage. Between 1946 and 1978, four significant tsunamis have been measured in the Ewa Beach area. These are listed below:

<u>TSUNAMIS MEASURED AT EWA BEACH</u>		
<u>Year</u>	<u>Tsunami Origin</u>	<u>Run-up*</u>
1946	Aleutian Islands	3 feet
1952	Kamchatka Peninsula	5 feet
1957	Aleutian Islands	9 feet
1960	Chile	9 feet

\*Above Mean Lower Low Water (MLLW) datum.

Based on the U. S. Government Flood Insurance Rate Map and a 100-year cycle, an 8-foot inundation zone has been designated for Ewa Beach. This tsunami inundation zone is depicted in Figure 5-5.

Littoral Processes. The shoreline between Barbers Point and Pearl Harbor is composed of exposed beach rock and limestone with occasional small beaches. The surface of the coralline limestone continues offshore, sloping gently seaward.

The beach sand throughout the area is moderately well sorted medium grained calcareous sand. Figure 5-6 shows offshore sand distributions. Major sand transport offshore of Oneula Beach Park is onshore-offshore. The beach and offshore sand channel are a reservoir sand system that remains more or less in equilibrium. Longshore transport is not as large, and apparently does not extend beyond the point at the proposed marina entrance site. Longshore transport related to wind stress would be to the west along prevailing wind directions. Observations between Ewa Beach, Oneula Beach, and Nimitz Beach do not indicate that significant amounts of material are transported along the shoreline between these beaches. This is evidenced by the lack of sand

5-38



**Reference:**

U.S. Department of Housing & Urban Development  
Federal Insurance Administration  
Flood Insurance Rate Map, dated Sept. 3, 1980

HSM & Associates  
Ewa Marina Community, Project Summary  
January 1984



Moffatt & Nichol, Engineers; Sept. 1985

Flood Control Basin

INCREMENT I

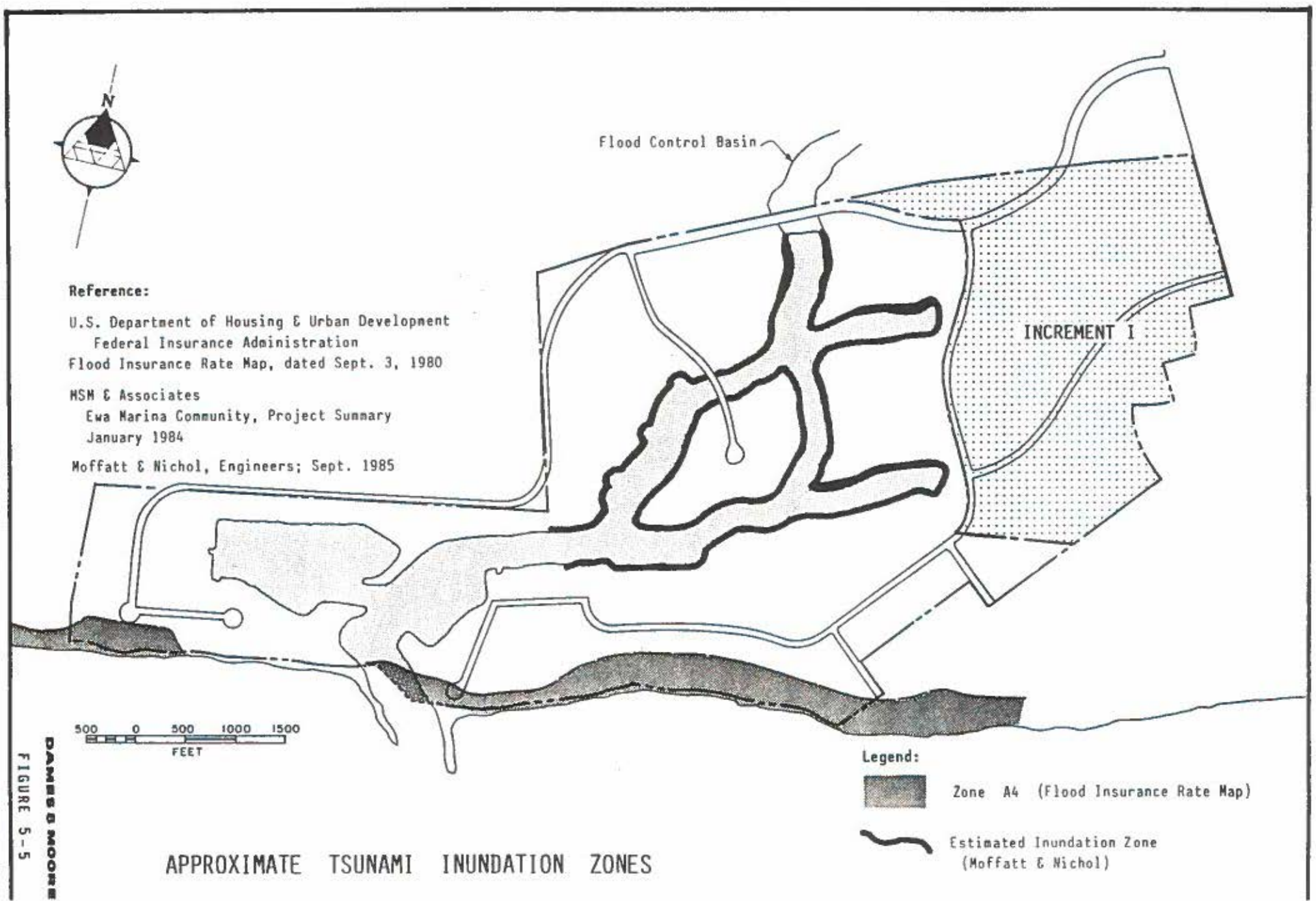


**Legend:**

-  Zone A4 (Flood Insurance Rate Map)
-  Estimated Inundation Zone (Moffatt & Nichol)


**APPROXIMATE TSUNAMI INUNDATION ZONES**

DAMES & MOORE  
FIGURE 5-5





## KEY TO MAP

500-Year Flood Boundary	—————
100-Year Flood Boundary	—————
Zone Designations* With Date of Identification e.g., 12/2/74	
100-Year Flood Boundary	—————
500-Year Flood Boundary	—————
Base Flood Elevation Line With Elevation In Feet**	~~~~~513~~~~~
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7 X
River Mile	• M1.5

\*\*Referenced to the National Geodetic Vertical Datum of 1929

### \*EXPLANATION OF ZONE DESIGNATIONS

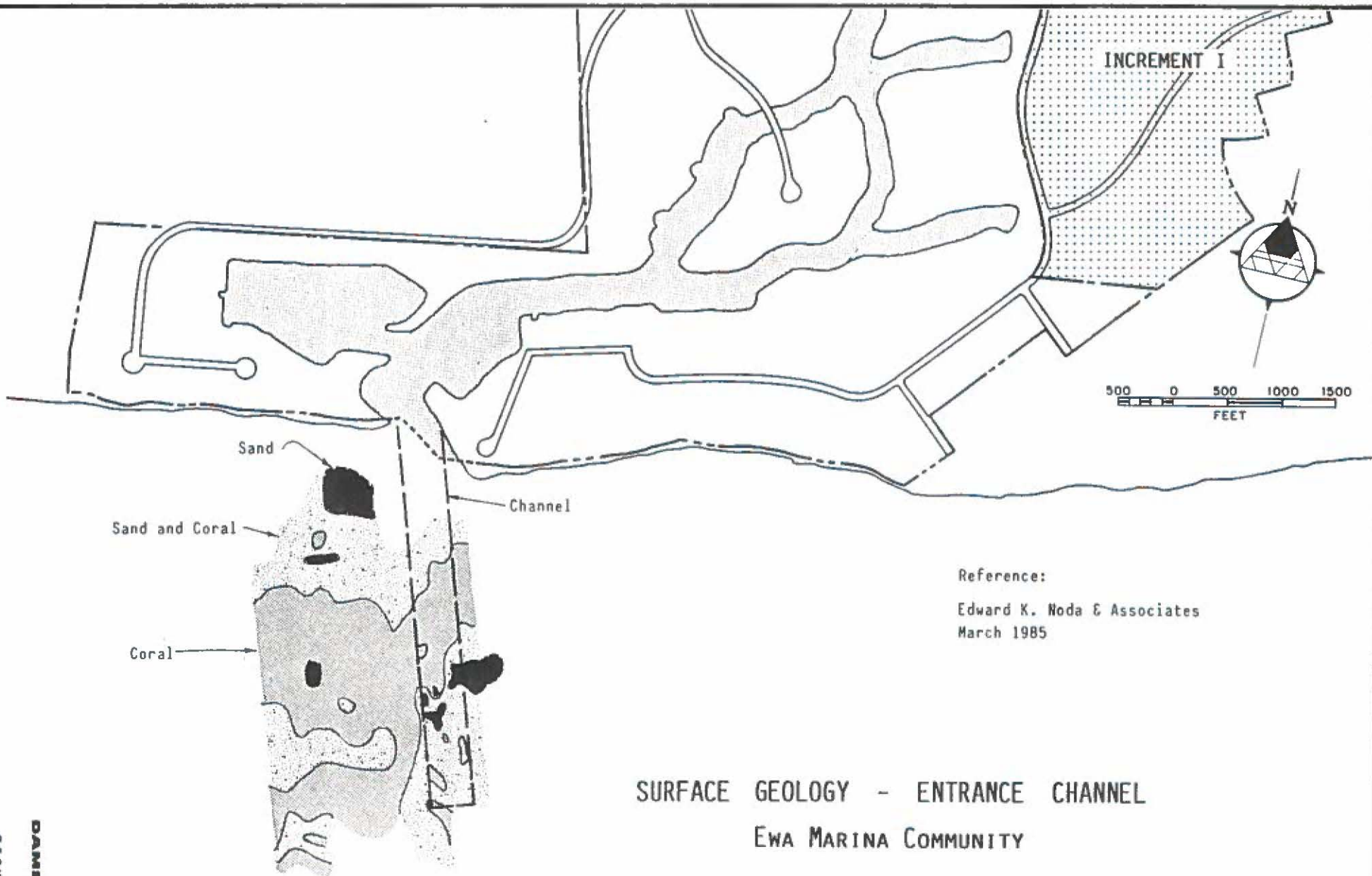
ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

### NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.



Reference:

Edward K. Noda & Associates  
March 1985

# SURFACE GEOLOGY - ENTRANCE CHANNEL EWA MARINA COMMUNITY



pockets to the west of the proposed marina entrance. Some material probably does move along the beachrock and on the reef, but the primary mode of transport is on-shore/off-shore with the direction determined by wave condition. No extensive surveys have been made of the beach to determine whether or not erosion or accretion is occurring. However, erosion studies of Ewa Beach over a period of one year found no conclusive trend. It is very likely that no measurable trend could be established within a few years' time at the project site. Analysis of aerial photographs in 1958, 1966, 1969, and 1976 and three beach profiles taken in the vicinity of Oneula Beach Park did not reveal any definite seasonal trend in the beach. It appears that Nimitz, Ewa, and Oneula beaches are stable.

It is concluded that the primary littoral cell of Oneula Beach extends from the rocky coastline immediately east of the project property to the rocky headland to the west where the proposed entrance channel is to be located. During kona winds, the littoral transport is to the east where the material may be deposited in the beach and the offshore sand reservoir. After return of the trade winds, the longshore transport reverses and carries material down to the proposed entrance channel. Surveys and descriptions of the reach from the proposed channel to Nimitz Beach are not available. Aerial photographs indicate no beach exists or has existed along this rocky coast between the outcrop and Nimitz Beach. The primary source of littoral material is probably deposits outside the coral reef and longshore transport appears to be relatively weak.

#### 5.8.3 Marine Geology

The geology offshore of the project was examined in 1985 (Noda & Associates, 1985). The bottom is depicted on Figure 5-6. The general marine substrate is a hard limestone reef. In the proposed project area, the shore limestone extends seaward to join the fringing reef along the south coast of Oahu. Farther offshore, the limestone substrate is covered with sand, coral, and rubble to various degrees.

Beach Sand. The sand present in the beach system is biogenic, calcareous, usually medium-grained, and poorly sorted. The major grain components are shell of foraminifera and rounded reefal fragments.

Beach Rock. Beach rock present is a stratified calcareous sandstone formed by the percolation of seawater or brackish water through sand.

Bathymetry. The bathymetry off of the proposed Ewa Marina Community is typical of the gently sloping bottom off of the Barbers Point area (see Figure 5-11).

#### 5.8.4 Water Quality

The waters off the project site are currently classified Class "A" designation, with beneficial uses including fishing, swimming, surfing, and other water contact recreational activities, aesthetic enjoyment, and the support and propagation of marine life. Environmental standards for waters of the class are listed in Table 5-16 (Class "A" Water Quality Standards). As shown in Table 5-17, the reported values for the coastal waters in Mamala Bay are very near, and in some cases above the current class "A" limits for

TABLE 5-16  
CLASS "A" WATER QUALITY STANDARDS

Parameter	Geometric mean not to exceed the given value	Not to exceed the given value more than 10% of the time	Not to exceed the given value
Total Kjeldahl Nitrogen (ugN/l)	150.00* 110.00**	250.00* 180.00**	350.00* 250.00**
Ammonia Nitrogen (ug NH <sub>4</sub> -N/l)	3.50* 2.00*	8.50* 5.00**	15.00* 9.00**
Nitrate + Nitrite Nitrogen [ug (NO <sub>3</sub> + NO <sub>2</sub> ) - N/l]	5.00* 3.50**	14.00* 10.00**	25.00* 20.00**
Orthophosphate Phos- phorus (ug PO <sub>4</sub> - P/l)	7.00* 5.00**	12.00* 9.00**	17.00* 13.00**
Total Phosphorus (ug P/l)	20.00* 16.00**	40.00* 30.00**	60.00* 45.00**
Light Extinction Coefficient (units)	0.20* 0.10**	0.50* 0.30**	0.85* 0.55**
Chlorophyll a (ug/l)	0.30* 0.15**	0.90* 0.50**	1.75* 1.00**
Turbidity (Nephelometric Turbidity Units)	0.50* 0.20**	1.25* 0.50**	2.00* 1.00**
Non-filtrable Residue (ug/l)	20,000.00* 10,000.00**	30,000.00* 15,000.00**	40,000.00* 20,000.00**

\* "Wet" criteria apply when the open coastal waters receive more than three million gallons per day of fresh water discharge per shoreline mile.

\*\* "Dry" criteria apply when the open coastal waters receive less than three million gallons per day of fresh water discharge per shoreline mile.

Applicable to both "wet" and "dry" conditions:

pH Units shall not deviate more than 0.5 units from a value of 8.1.

Dissolved Oxygen - Not less than 75% saturation.

Temperature - Shall not vary more than 1°C from ambient conditions.

Salinity (ppm) - Shall not vary more than 10% from natural or seasonal changes considering hydrologic input and oceanographic factors.

Source: Chapter 37-A, Public Health Regulations



TABLE 5-17

## WATER QUALITY DATA IN MAMALA BAY AND TRIBUTARY AREA

	Station*	Avg. D.O.* mg/l	Avg. Total N* ug/l	Avg. Total p* mg/l	Avg. Secchi Depth	Avg. BOD mg/l	Avg. Total Coliform col/100 ml
	12	5.61	224.0	014.0	51	1.1	0
Ewa Beach	13	6.17	252.0	067.0	79	0.9	0
	14	6.28	186.0	035.0	100	0.8	0
Barbers Point	15	6.36	124.0	026.0	47	1.0	0

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Source: After Engineering Sciences et al., 1972

\*D.O. = Dissolved Oxygen

\*N = Nitrogen (organic and ammonia)

\*p = phosphorus

\*Station = Locations are former Dept of Public Works Stations  
(Data represents off-shore open coastal waters)

nutrients. 1972 water quality data for the Ewa Beach near shore area also is summarized on Table 5-17.

## 5.9 HISTORY AND ARCHAEOLOGY

### 5.9.1 History

In the 1830s approximately one fourth of the Ewa district population lived within the Honouliuli area. In the 1831 to 1832 missionary census Honouliuli had a population of 1,026 people; in the 1835 census it had only 870 people, a loss of 156 persons within four years. A loss of over 15 percent of the population was not unusual for these early years of Hawaiian contact with the outside world. In the early 1800s an epidemic called Ma'i oku'u (squatting sickness, perhaps cholera) devastated the Hawaiian population from Hawaii to Kauai. Missionary Lowell Smith estimated in 1835 that there were from eight to ten deaths for every birth in the Ewa district.

In 1877 James Campbell purchased 41,000 acres of land at Honouliuli for \$95,000. He constructed fences and chased out over 32,000 head of cattle that were living in the area. By 1881 Honouliuli was the center of a prosperous ranch that had "abundant pasturage of various kinds". Campbell had leased out rice lands, fishing rights at Pearl Harbor, and a lime quarry. In addition, cattle were brought to the Honouliuli ranch for fattening before being slaughtered to supply the Honolulu market. At that time about 10,000 acres of ranch land were devoted to agriculture.

In 1889 Honouliuli was leased to Dillingham for 50 years and Ewa Sugar Plantation was established in the lower portion of the area.

In late 1939 or early 1940, the U.S. Navy acquired over 3,500 acres of land from the Campbell Estate. The first military installation was known as the Ewa Marine Corps Air Station, Barbers Point, until the present Barbers Point Naval Air Station was Commissioned in 1942.

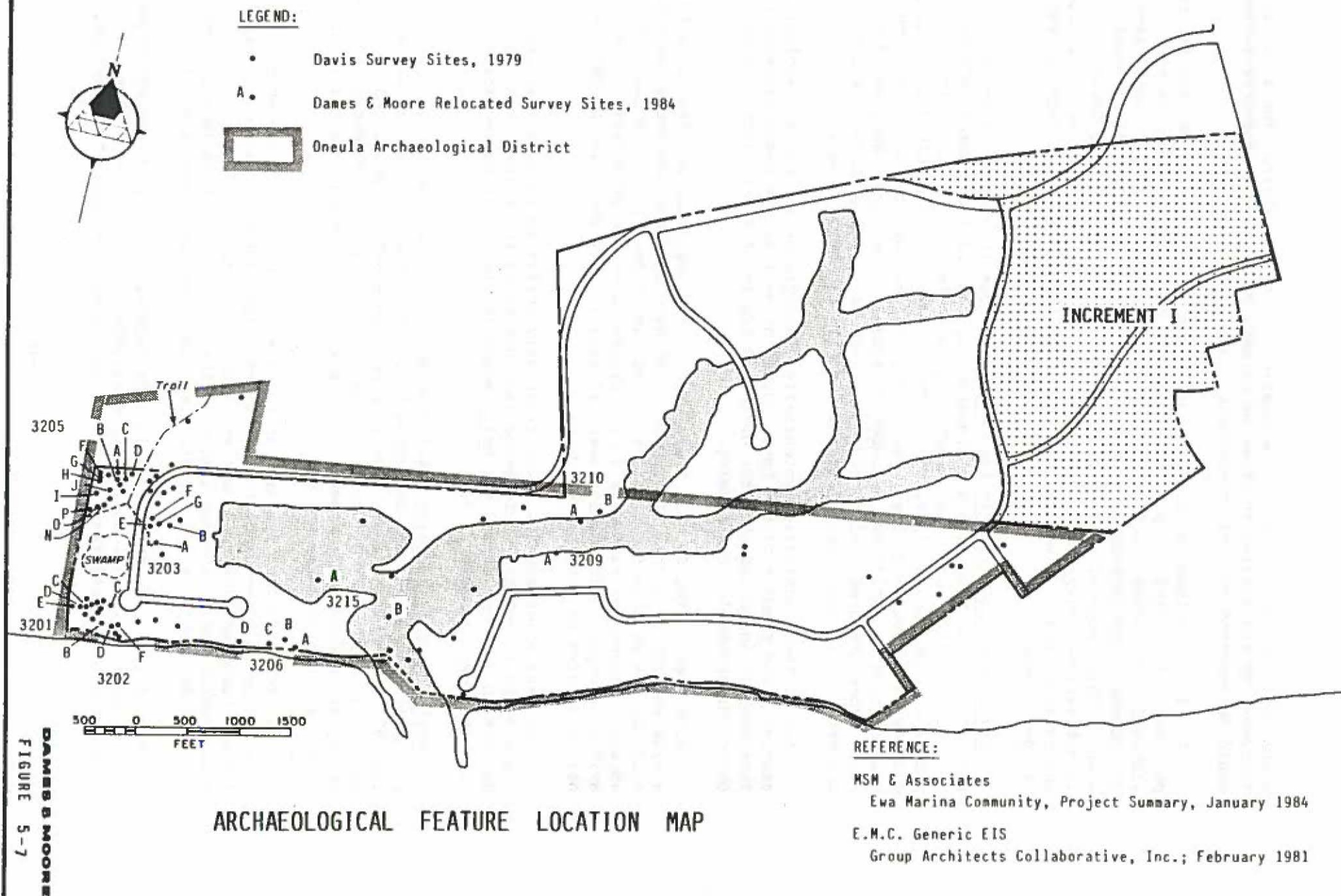
### 5.9.2 Archaeology

The area of archaeological concern for Increment II is the State designated Oneula Archaeological District on the southern or makai portion of the project (Figure 5-7). The area includes the forested coastal strip extending from the Ewa Beach residential community to White Plains Military Recreation Area.

Davis mapped and described the archaeological features of the area and his entire report was included in the programmatic EIS for Ewa Marina Community. Although the Davis Survey included coverage of all archaeologically significant areas within Increment II, there is a possibility that potentially significant site areas remain undiscovered under the forest litter (Davis, 1979), and there is variability in the accuracy of the data collected due to time constraints on the initial study.

In addition, there has been extensive research on archaeological sites in the area of the Barbers Point Deep Draft Harbor sponsored by the U.S. Army Corps of Engineers since 1979. This research has shed new light on the





prehistoric and early historic occupation of the Ewa Plain. The sites in Increment II are similar to those at Barbers Point in many characteristics and would be expected to yield comparable kinds of data.

For this supplemental EIS, a short reconnaissance was conducted for the purpose of evaluating the present conditions of the previously identified archaeological sites, to provide supplementary data on their significance and to recommend appropriate action in view of the Increment II development plans. This reconnaissance was not intended to supercede the Davis investigation. Only some of the originally identified sites were relocated and examined and no investigation above the level of a short reconnaissance was performed.

Environment and Historic Land Use. The coastline within a few hundred feet of the high tide line was dramatically altered for coastal defense during the early 1940's. Concrete structures, including anti aircraft placements, and tank traps, are still visible. Their construction involved bulldozing and grading in surrounding areas. Additionally, many areas behind the beach have been cleared by bulldozers a number of times in the past. Many abandoned roads cross the area. Also, there are various drainage channels which traverse the forested area from the cane fields to the coast.

All of these activities potentially destroyed or altered archaeological remains. The results of the Davis Survey as well as the reconnaissance for Increment II indicated that the disturbed tracts of the project area are devoid of archaeological remains.

Sinkholes in the Barbers Point area of the Ewa Plain are the depository of a wide variety of fossil bird bones which have been the subject of extensive study by the Smithsonian Institute (Olsen and James, 1982). Because of the apparent absence of sinkholes in the project area the potential of similar avifaunal deposits in the Increment II area is very small and probably would not be located by surface survey.

One area which appears to be relatively unaltered by post-1940 land use is the western extent of the forested land bordering the White Plains Military Recreation Area and around the Batis swamp (Davis, 1979, Survey Area I). The area is shown on Figure 5-7.

Archaeological Features. All archaeological features identified in Increment II are Located on Figure 5-7. Those features re-examined during the 1984 reconnaissance are indicated on Figure 5-7 and described in Table 5-18. The list of archaeological features identified during the 1979 survey are presented in Appendix D as part of the comments from the University of Hawaii Environmental Center.

The archaeological features in the area of the Batis swamp were examined in addition to sites along the coast and inland sites including the large feature numbered 3209A. Effort was made to locate other sites but was unsuccessful due to the small size of the available feature location map. It is possible also that some of the sites have been destroyed since 1979.

All of the sites reexamined in this reconnaissance with the exception of 3209-A consist of small shelter type structural remnants -- C-shape structures, low platforms, and miscellaneous small mounds, "ahu" and wall



TABLE 5-18

SELECTED ARCHAEOLOGIC FEATURES OF THE PROPOSED EWA MARINA COMMUNITY:  
INCREMENT II (CONDENSED DESCRIPTION)

<u>Site Number</u>	<u>Feature</u>	<u>Feature Type</u>	<u>Remarks</u>
3201	C	Rectangular	Third of three adjacent platforms, a small elevated floor of limestone cobbles; structure appears disturbed with extensive rubble around floor.
	D	Hidden Deposit	Possible subsurface deposit of unknown extent exposed in recent disturbance.
	E1	Hidden Deposit	Possible subsurface deposit of unknown extent or depth indicated by surface scatter.
	E2	Mound	Seven probably recent rock mounds spaced in a straight line.
3202	B	Hidden Deposit	Subsurface deposit of unknown extent exposed by up-root tree.
	C	C-shape	Small angular C-shaped wall of multiple-stacked cobbles and small boulders with possible up-right slabs inside-facing.
	D	Rectangular Platform	Very large elevated floor of limestone cobbles with probable remnant facing of multiple-stacked cobbles and small boulders.
	F	Platform	A broad indefinite limestone cobble and small boulder mound which appears to possibly be a deteriorated platform.
3203	A1	Rectangular Platform	A large elevated limestone cobble floor defined on four sides by foundation of small boulders and cobbles set in place.

Table 5-18  
Continuation

<u>Site Number</u>	<u>Feature</u>	<u>Feature Type</u>	<u>Remarks</u>
3203	A2	Enclosure	Several badly disturbed sections of former free-standing wall once enclosing an area around Platform A1.
	B	Structure	A disturbed structure which may be a platform with abutting C-shaped wall.
	E	Structure	A very disturbed structure, possibly remnant platform.
	F	Rectangular	A large elevated limestone cobble floor apparently divided into two areas.
	G	<u>Ahu</u>	A large oval <u>ahu</u> of multiple-stacked construction and facing of up-right slabs about two-thirds of the way around.
3205	A1	Rectangular Enclosure	A large walled enclosure of multiple-stacked construction with several up-right limestone slabs in exterior facing.
	A2	C-shape	Poorly preserved C-shaped wall abutting Feature A1 (above) and oriented with open side to southeast.
	B	Rectangular Enclosure	A large two-room enclosure of multiple-stacked construction and some up-right limestone slabs in exterior and interior facings.
	C	Structure	Disturbed structure which appears to be two or three adjoining C-shaped shelters.
	D	Structure	Another possible series adjoining C-shaped shelters.



Table 5-18  
Continuation

<u>Site Number</u>	<u>Feature</u>	<u>Feature Type</u>	<u>Remarks</u>
3205	F	Rectangular Enclosure	A walled enclosure of multiple-stacked construction with a low up-right limestone slabs.
	G	<u>Ahu</u>	Large circular <u>ahu</u> of multiple-stacked construction with generally well preserved facing of small boulders and up-right limestone slabs.
	H1	C-shape	A somewhat angular C-shaped wall with two probable corners in rear wall section
	H2	Mound	Several large rock mounds and other smaller mounds.
	I1	C-shape	A small C-shaped shelter wall with at least one corner in back wall.
	I2	Mound	A low stacked boulder and cobble mound with a central cavity.
	J	Triangular Enclosure	Roughly triangular or subcircular walled structure of multiple-stacked construction.
	K	Triangular Enclosure	A roughly triangular walled enclosure badly disturbed with only sections of exterior facings in place
	O	C-shape	The remnant of well-built core-filled C-shaped wall with interior and exterior facings of up-right limestone slabs.
	P	Structure	A very disturbed rectangular structure or a platform or possibly a leveled enclosure.

Table 5-18  
Continuation

<u>Site Number</u>	<u>Feature</u>	<u>Feature Type</u>	<u>Remarks</u>
3206	A	Rectangular Enclosure	A distrubed roughly rectangular walled enclosure of multiple-stacked construction with some possible up-right limestone slab facing.
	B	Rectangular Platform	Large elevated floor of small boulders and cobbles defined in part by facing of multiple-stacked constuction.
	C	C-shape	Large distrubed C-shaped wall of multiple-stacked construction with several up-right limestone slabs.
	D	Wall	Segment of free-standing core-filled wall oriented perpendicuar to the coast.
3209	A	Rectangular Platform	A very large square two-tiered platform built on limestone outcrop which forms the lower tier.
3210	A	Rectangular Enclosure	A small rectangular enclosure of multiple-stacked construction with apparently interior facing of up-right limestone slabs.
	B	C-shape	A C-shaped shelter wall of multiple-stacked construction.
3215	A	C-shape	Deteriorated C-shaped shelter of multiple-stacked construction.
	B	C-shape	A C-shaped shelter wall of multiple-stacked construction and apparently some core-filling in back wall.



remnants. Those within the vicinity of the Batis swamp are fairly intact and occur in relatively well defined clusters (sites 3202, 3203, and 3205). These are probably late prehistoric and early historic Hawaiian habitation features which contain the remains of former occupation scattered around them - shell midden, volcanic glass and artifactual material. Although the deposits of this material are almost certainly not deep, they extend with depth into the limestone rubble and with area beyond the margins of the structures, similar to those in the Barbers Point Harbor area.

The examination of the features of site 3206, situated directly behind the beach in Davis Survey Area II, was less conclusive. These structures are in poor condition and in some cases it is questionable whether they are of ancient origin or are the remains of modern beach activity. This observation may apply to the other coastal features previously recorded in Survey Area II.

Site 3209 Feature A, situated between two drainage channels and west of the present chicken farm, stands out from all other archaeological features examined because of its relatively large size (8 meters square). It is probably not a habitation site but more likely a burial.

All 107 archaeological sites recorded in the Davis Survey are included in an area which was designated as the Oneula Archaeological District. A request for determination of eligibility was made by the U. S. Army Corps of Engineers to The Keeper of the National Register of Historic Places in 1979. This request was made on the basis of the State Historic Preservation officers opinion that the sites are likely to yield information important to Hawaiian prehistory or history. Because the boundaries of the proposed district included canefields devoid of archaeological significance, the request for determination was returned to the Army Corps of Engineers for revision. Additional documentation on the sites within the proposed district also was requested for The Keeper to determine eligibility. At this time, the status of the Oneula Archaeological District is unclear, as this information has yet to be submitted to the keeper of the National Register of Historic Places by the U. S. Army Corps of Engineers.

## 5.10 ACOUSTICS

Sound is a form of energy detectable by humans and is commonly produced when an object is caused to vibrate. The effect of ambient sound levels on people depend on the sensitivity of the people and the magnitude, frequency and duration of separate sound levels contributing to the ambient sound level.

Noise is defined as unwanted or objectionable sound. Noise may result in a number of auditory and nonauditory effects. Auditory effects include hearing loss or impairment and interference with communication. Nonauditory effects include annoyance and interference with sleep.

Several agencies have developed guidelines and standards specifying sound levels consistent with the protection of public health and welfare. These standards and guidelines are discussed in Section 5.10.1. Existing sound levels in the project site are discussed in Section 5.10.3.

### 5.10.1 Existing Noise Guidelines and Standards

Noise guidelines and standards relevant to the project have been developed by federal, state and local agencies. However, because the guidelines of different agencies have been reported using different statistical descriptors, acceptability categories contained within them are not directly comparable. For this reason, a brief explanation of accoustical nomenclature and the various statistical descriptors used to characterize time-varying sound follows.

Nomenclature. The range of sound pressures that can be heard by humans is large. This range varies from two ten-thousand-millionths ( $2 \times 10^{-10}$ ) of an atmosphere for sounds barely audible to humans to two thousandths ( $2 \times 10^{-3}$ ) of an atmosphere for sounds which are so loud as to be painful. The decibel (dB) notation system is used to present sound levels over this wide physical range. Essentially, the decibel system compresses this range to a workable range using logarithms. Sound level is defined as:

$$\text{Sound level in decibels (dB)} = 20 \log_{10} \left( \frac{P}{P_0} \right)$$

Where

$P_0$  = a standard reference sound pressure required for a minimum sensation of hearing.

$P$  = measured sound pressure level

Zero decibel is assigned to the minimum level and 140 decibels is assigned to a level of sound which is painful. Thus, a range of more than 1 million is expressed on a scale of zero to 140 decibels.

The human ear does not perceive sounds at low frequencies in the same manner as those at higher frequencies. Sounds at low frequency (below 500 Hz) and high frequency (above 4000 Hz) do not seem as loud as those of equal intensity at middle frequencies. The A-weighting network is provided in sound analysis systems to simulate the human ear. A-weighted sound levels are expressed in units of dB termed dB(A). These levels in dB are used to evaluate hearing damage risk (as is done by the Occupational Safety and Health Administration (OSHA)) or community annoyance impact. These values are also used in federal, state, and local noise ordinances. The term sound level, as used in this report, is understood to represent the A-weighted sound level unless otherwise noted.

Sound is not constant in time. Statistical analysis is used to describe the temporal distribution of sound and to compute single-number descriptors for the time-varying sound. This report contains the following statistical A-weighted sound levels:



- $L_x$  : The sound level exceeded x percent of the time where:  
 $L_{10}$  represents the "intrusive" sound level.  
 $L_{50}$  represents the "median" sound level.  
 $L_{90}$  represents the "residual" sound level.
- $L_{eq}$  : Equivalent (energy-average) sound level which provides an equal amount of acoustic energy as the time-varying sound.
- $L_d$  : Equivalent sound level,  $L_{eq}$ , for the daytime period (7 a.m.-10 p.m.) only.
- $L_n$  : Equivalent sound level,  $L_{eq}$ , for the nighttime period (10 p.m.-7 a.m.) only.
- $L_{dn}$  : Day-night sound level, defined as:

$$L_{dn} = 10 \log_{10} ([15 \times 10^{L_d/10} + 9 \times 10^{(L_n + 10)/10}] / 24)$$

The  $L_{dn}$  represents the equivalent A-weighted sound level during a 24-hour day after adding a 10-dB correction factor to the nighttime sound level to reflect the greater impact of noise during nighttime periods. Impact assessments for this report utilize  $L_{dn}$  as the statistical descriptor of 24-hour average equivalent levels.

Community Standards. A widely-recognized set of community noise exposure guidelines have been developed by the U.S. Environmental Protection Agency (EPA). The EPA "Levels Document" (EPA, 1974) has suggested that day/night sound levels ( $L_{dn}$ ) below 55 dB for residential, recreational and other noise sensitive areas will protect public health and welfare. While this is EPA's long term goal, an estimated 103 million United States citizens are exposed to sound levels greater than 55 dB. For this reason, EPA has adopted a short term goal of reducing community sound levels to below 65 dB (EPA, 1977).

The short term goal of a 65 dB value agrees with a number of state, industrial, and community noise regulations which set limits for day time sound levels of 65 dB and night time limits of 50 dB, including, the U. S. Department of Housing and Urban Development (HUD) which has set 65 dB ( $L_{dn}$ ) as a maximum acceptable sound level for new residential developments (HUD, 1979). Table 5-19 presents a summary of community noise guidelines and standards adopted by EPA, HUD and other federal agencies.

The State of Hawaii has developed a set of noise guidelines and policies as part of the Honolulu International Airport (HIA) and Environs Master Study (Department of Transportation, 1981). The land use noise controls described in the HIA study are shown in Table 5-20. These data indicate that new or redeveloped noise sensitive land uses would be prohibited in areas with a sound level greater than 65 dB.

The U. S. Navy has also developed information associated with sound levels and land use compatibility (U.S. Navy, 1979). These data are shown in Table 5-21.

**TABLE 5-19**  
**SUMMARY OF FEDERAL NOISE GUIDELINES AND STANDARDS**

**NOISE ZONE CLASSIFICATION**

Noise Exposure Class	Noise Descriptor			HUD Noise Standards For New Residential Development
	DNL <sup>1</sup> Day-Night Average Sound Level	L <sub>eq</sub> (hour) <sup>3</sup> Equivalent Sound Level	NEF <sup>4</sup> Noise exposure Forecast	
Minimal Exposure	Not Exceeding 55	Not Exceeding 55	Not Exceeding 20	"Acceptable"
Moderate Exposure	Above 55 <sup>2</sup> But Not Exceeding 65	Above 55 But Not Exceeding 65	Above 25 But Not Exceeding 30	
Significant Exposure	Above 65 Not Exceeding 70	Above 65 Not Exceeding 70	Above 30 Not Exceeding 35	"Normally Unacceptable"
	Above 70 But Not Exceeding 75	Above 70 But Not Exceeding 75	Above 35 But Not Exceeding 40	
Severe Exposure	Above 75 But Not Exceeding 80	Above 75 But Not Exceeding 80	Not Exceeding 45	"Unacceptable"
	Above 80 But Not Exceeding 85	Above 80 But Not Exceeding 85	Above 45 But Not Exceeding 50	
	Above 85	Above 85	Above 50	

<sup>1</sup>CNEL - Community Noise Equivalent Level (California only) uses the same values.

<sup>2</sup>HUD, DOT, and EPA recognize L<sub>eq</sub> = 55 dB as a goal for outdoors in residential areas in protecting the public health and welfare with an adequate margin of safety (Reference: EPA "Levels" Document.) However, it is not a regulatory goal. It is a level defined by a negotiated scientific consensus without concern for economic and technological feasibility or the needs and desires of any particular community.

<sup>3</sup>The Federal Highway Administration (FHWA) noise policy uses this descriptor as an alternative to L<sub>10</sub> (noise level exceeded ten percent of the time) in connection with its policy for highway noise mitigation. The L<sub>eq</sub>(design hour) is equivalent to DNL hours; 2) traffic between 10 p.m. and 7 a.m. does not exceed fifteen percent of the average daily traffic flow in vehicles per 24 hours. Under these conditions DNL equals L<sub>10</sub> - 3 decibels.

<sup>4</sup>For use in airport environs only; is now being superseded by DNL.

Source: Federal Interagency Committee on Urban Noise - "Guidelines for Considering Noise in Land Use Planning and Control" - NTIS PB81-214124, June 1981.



**TABLE 5-20**  
**LAND USE CONTROLS AND PROGRAMS**  
**HONOLULU INTERNATIONAL AIRPORT ENVIRONS**

Noise Exposure Area (Ldn)	Land Use Control or Program <sup>a</sup>	Prime Responsibility for Implementation	Approximate Staging
<u>CONTROLS</u>			
65*	• Prohibit any new or redeveloped noise-sensitive land uses within these areas.	City and County of Honolulu	1982
60 to 65	• Require the dedication of aviation easements for all new or redeveloped noise-sensitive land uses. <sup>b</sup>	City and County of Honolulu	1982
60 to 65	• Require acoustical treatment for all new or redeveloped structures of noise-sensitive land uses.	City and County of Honolulu	1982
60*	• Enact a truth-in-sales ordinance.	City and County of Honolulu	.
*	• Rezone portions of the Airport Environs in areas where the existing zoning is: 1) inconsistent with the existing land use pattern; 2) inconsistent with an eventually adopted Development Plan Ordinance; or 3) incompatible with Airport and aircraft operations.	City and County of Honolulu	1982-1983
60*	• Acquire the development rights for all undeveloped privately owned land east of the Airport, but only at such time, if ever, it is found that zoning is inadequate to maintain compatible land use.	City and County of Honolulu U.S. Navy	Unknown
*	• Modify the Development Plan Ordinances for the Primary Urban Center and Ewa to emphasize: 1) the importance of Honolulu International Airport to the State Transportation system and economy; and 2) the importance of achieving land use compatibility.	City and County of Honolulu	1981
*	• Retain the two-lane configuration of Fort Weaver Road through the Airport Environs, but modify the road to improve safety.	State of Hawaii Dept. of Transportation	1961-2000
65*	• The U.S. Air Force and U.S. Navy should consider restricting all future military housing to locations outside these noise exposure areas.	U.S. Air Force U.S. Navy	1982
60*	• The U.S. Air Force and U.S. Navy should consider providing acoustical treatment in all new military housing located within these noise exposure areas.	U.S. Air Force U.S. Navy	1982
<u>PROGRAMS</u>			
70 to 75	• Establish a modified purchase assurance program for all existing single-family dwellings in this noise exposure area.	Airports Division	1990-2000
65 to 70	• Establish a cost sharing acoustical insulation program. <sup>d</sup>	Airports Division	1985-2000
60*	• The U.S. Air Force and U.S. Navy should consider providing acoustical treatment in all existing military housing that does not currently meet interior noise levels of Ldn 45.	U.S. Air Force U.S. Navy	1982-1990
*	• Adopt a preferential runway use program to encourage military aircraft arrivals on Runway BX.	U.S. Military	1982

Ldn = Day-night average sound level. Noise exposure levels are those predicted in the year 2000 as a result of aircraft operations at Honolulu International Airport.

\* The land use control or program does not apply to specific range of noise exposure.

a. Applies to civilian areas only, unless otherwise specified.

b. As part of this program, the Subdivision Rules and Regulations should be amended to require the aviation easement dedication.

c. A part of this program, the Building Code should be modified to include specifications for levels of noise reduction and inspection techniques for ensuring compliance.

d. Subject to legislative approval and appropriation of necessary funds.

SOURCE: "Summary of Findings, Honolulu International Airport and Environs Master Plan Study". June 1981.

TABLE 5-21

## LAND USE COMPATIBILITY IN NOISE AREAS

Land Use Category	Noise Zone					
	← 1	2		3 →		
	Day-Night Average Sound Level (Ldn)					
	60	65	70	75	80	85
Residential - Single Family, Duplex				•••••	•••••	•••••
Residential - Multifamily, Dormitories, etc.				•••••	•••••	•••••
Transient Lodging				•••••	•••••	•••••
Industrial - Service & Distributive					•••••	•••••
Commercial - Wholesale Trade Some business services						•••••
Commercial - Retail Trade, Movie Theaters, Eating and Drinking					•••••	•••••
Commercial - Some Retail Trade (not noise sensitive)						•••••
Office Buildings (Personal, Business, and Professional Services)					•••••	•••••
Classrooms, Libraries, Churches				•••••	•••••	•••••
Hospitals, Medical Facilities, Nursing Homes (24hr. occupancy)				•••••	•••••	•••••
Auditoriums, Concert Halls		•••••		•••••	•••••	•••••
Outdoor Music Shells		•••••	•••••	•••••	•••••	•••••
Outdoor Sports Arenas, Outdoor Spectator Sports			•••••	•••••	•••••	•••••
Playgrounds, Neighborhood Parks, Active Sport Recreational Arenas			•••••	•••••	•••••	•••••
Golf Courses, Riding Stables, Water Recreation				•••••	•••••	•••••
Agricultural (except livestock), mining, Fishing					•••••	•••••

Clearly Compatible



Clearly Incompatible



Normally Compatible



Normally Incompatible



1. **CLEARLY COMPATIBLE:** The noise is such that the activities associated with the land use may be carried out with essentially no interference from aircraft noise. (Residential areas: both indoor and outdoor noise environments are pleasant.)
2. **NORMALLY COMPATIBLE:** The noise exposure is great enough to be of some concern, but common building construction will make this indoor environment acceptable, even for sleeping quarters. (Residential areas: the outdoor environment will be reasonably pleasant for recreation and play.)
3. **NORMALLY INCOMPATIBLE:** The noise exposure is significantly more severe so that special building construction is often necessary to minimize adverse impacts on people and reduce interference with performance of normal activities. (Residential areas: barriers are sometimes erected between the site and prominent noise sources to improve the outdoor environment; sound attenuation is recommended in some buildings.)
4. **CLEARLY INCOMPATIBLE:** The noise exposure at the site is so severe that construction costs to make the indoor environment acceptable for performance of activities is significantly more expensive. (Residential areas: the outdoor environment would be significantly impacted for normal residential use.)
5. The compatibility matrix has been determined by a number of noise sensitivity factors including: speech communication needs; subjective judgments of noise compatibility and relative noisiness; need for freedom from noise intrusions; sleep sensitivity criteria; accumulated case histories of noise complaint experience; and typical noise insulation provided by common types of building construction.
6. For many land uses, higher levels of exterior noise exposure may be acceptable provided there is a proper degree of building noise insulation. Such tradeoffs are possible for land uses where indoor activities predominate.

SOURCE: OPHAVIST 11010.36, May 25, 1979. Exhibit IV-4.



### 5.10.2 Existing Sound Sources

The existing sound levels within the Ewa Marina Community area are generated by four sources (wind, surf, vehicles, and aircraft) and vary temporarily and spatially. Surf generated noise is more limited to the coastal zone.

Ground Vehicular Noise. Ground vehicular noise originates from use of the back roads of the project area by dirt bikes, automobile traffic to coastal recreation areas, and residential traffic along Papipi and Fort Weaver Roads. The housing area, east of Fort Weaver Road, is currently subjected to noise created by vehicular traffic. Traffic and noise along Papipi Road is generally light.

Aircraft. The most significant area noise source is the Naval Air Station Barbers Point (NASBP).

Operations at NASBP are conducted on a 24-hour basis and consist primarily of fixed wing propeller driven aircraft, with most flights during daylight hours. Fixed wing jet and rotary wing aircraft operations occur daily at less frequent intervals. Light twin-engine aircraft and smaller variety also use NASBP regularly.

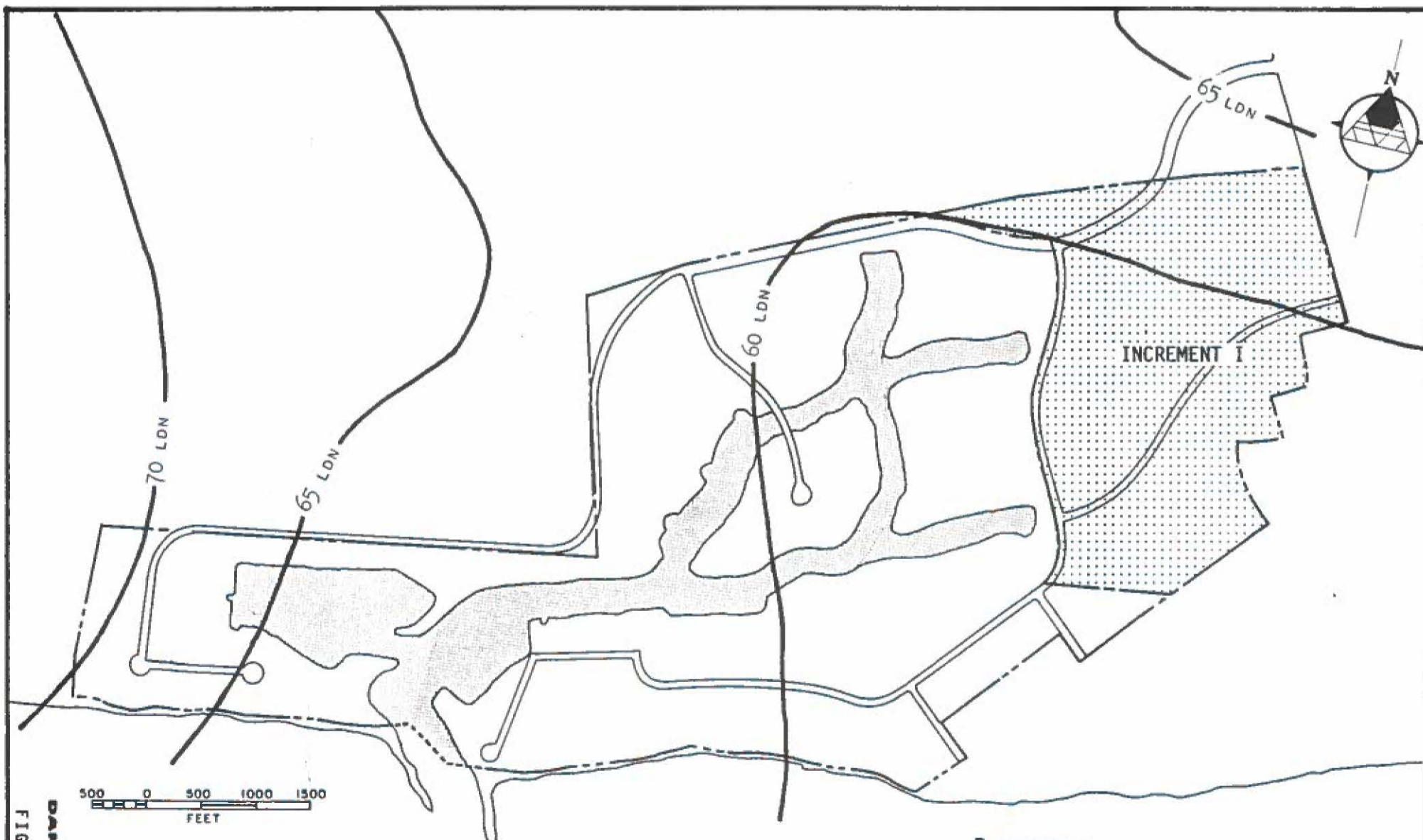
Aircraft landing at Honolulu International Airport fly over a navigation point about a mile north of the project's perimeter, descending at reduced power through 2,000 feet. This navigation point is north of Increment II.

### 5.10.3 Existing Sound Levels

Existing sound levels in the project site area have been subject to study by the U.S. Navy as part of the Air Installations Compatible Use Zone (AICUZ) plan for the Naval Air Station at Barbers Point (U.S. Navy, 1984), and by the Estate of James Campbell (Parnell Associates Inc., 1984). The AICUZ studies present sound level projections for the project site based on Barbers Point Naval Air Station aircraft type and characteristics, flight patterns, and the NOISEMAP prediction model.

The results of the U.S. Navy predictions are shown on Figure 5-8. The predictions include HIA aircraft and use a 260 days/year noise generation pattern. The results indicate sound levels on the property range from below 60 Ldn (in the southeast corner) to approximately 70 Ldn at the western property boundary. These data do not include impacts associated with other noise sources in the project site area.

The results of a Campbell Estate analysis are shown on Figure 5-9. The predictions include HIA aircraft and use a 365 days/year noise generation pattern. The results indicate sound levels on the property range from below 60 Ldn in the southeast corner to approximately 70 Ldn at the western property boundary. Also, as with the Navy data, these data do not include impacts associated with other (non-aircraft) noise sources in the project site area. The data shown in Figure 5-9 are different than the U.S. Navy study in that the predicted sound levels greater than 65 Ldn are shifted to the west and cover less of the proposed project area.



# U.S. NAVY AICUZ NOISE CONTOURS

BASED ON 260 DAYS PER YEAR

NOTE: CONTOURS IN DAY-NIGHT LEVELS

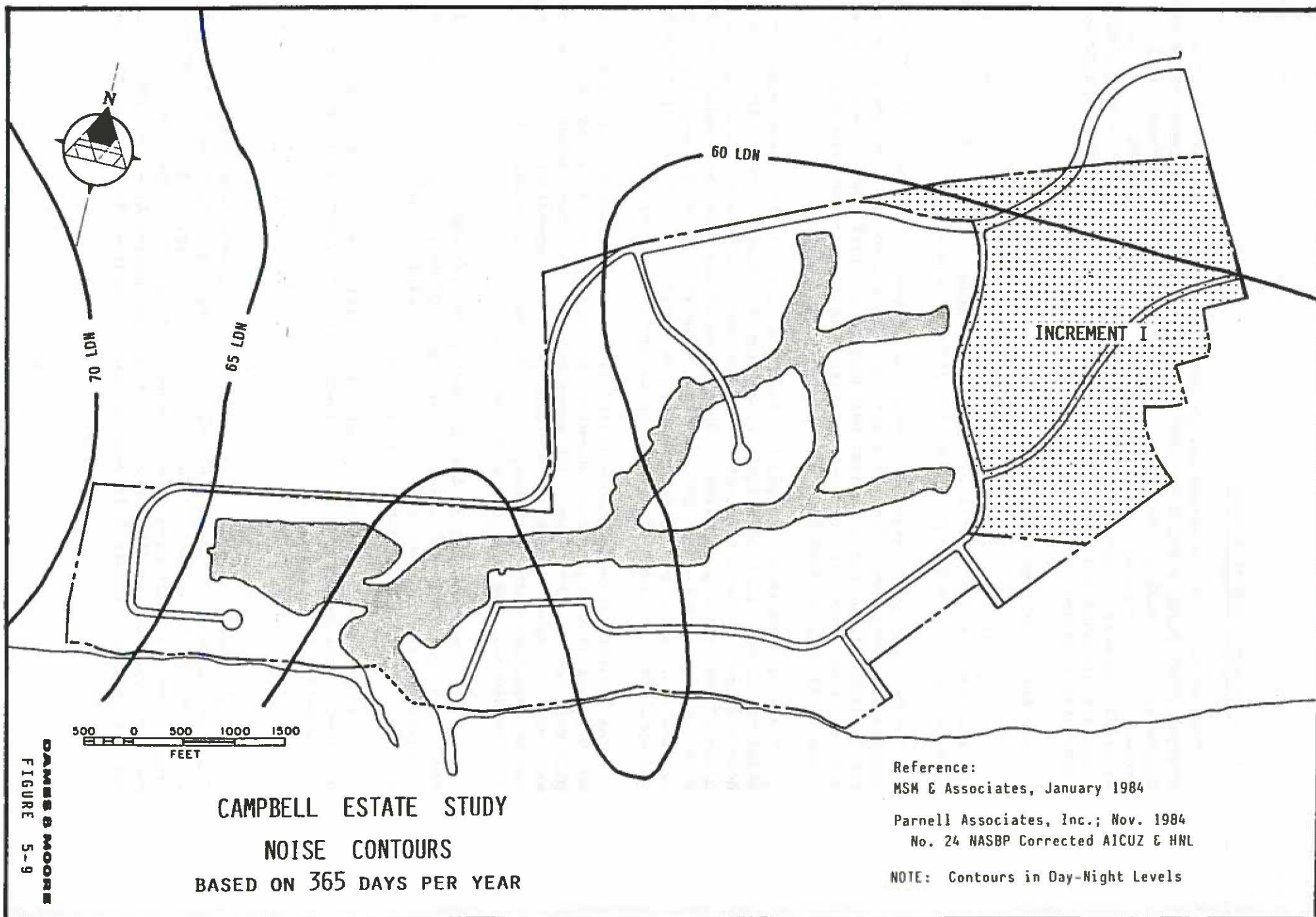
## REFERENCE:

MSM & ASSOCIATES

EWA MARINA COMMUNITY. PROJECT SUMMARY  
JANUARY 1984

U.S. NAVY, 1984, EXHIBIT IV-3





## 5.11 ACCIDENT POTENTIAL ZONE

The potential for aircraft accidents in areas on and around Naval Air Station (NAS) Barbers Point is used in combination with the restrictive noise boundaries to establish the AICUZ area. Accident Potential Zones (APZ) geometry is based on analyses of Army, Navy, Air Force, and Marine Corps aircraft accident history. These zones are applicable to all Navy and Marine Corps air stations and are based on the Navy interpretation and application of guidelines provided in OPNAVINST 11010.36 dated May 25, 1979.

### 5.11.1 APZ Guidelines and Standards

The accident potential concept is not directly based on crash probability, but analyzes the acceptability of land uses assuming a crash did occur in an area having a measurable potential for aircraft accidents.

The Navy has two classes of runways and three classes of APZ's. Class A runways are those restricted to light aircraft and do not have the potential for development for heavy or high performance aircraft use. Class B runways are all other fixed-wing runways. Aircraft included in the APZ analysis are those using only a Class B runway.

The area immediately beyond the end of a runway is the clear zone, an area which possesses a high potential for accidents. Traditionally, this zone has been acquired by the Government in fee (or restrictive use easements) and kept clear of obstructions to flight. Because the clear zone represents the area with the highest potential for accidents, the guidelines preclude most types of land use. Only open space uses such as agriculture and certain types of transportation are permitted, subject to severe restrictions.

The Accident Potential Zone I (APZ-I) is the area beyond the clear zone which possesses a significant potential for accidents. It is normally provided under flight paths which experience 5,000 or more annual operations. As a minimum, APZ-I is used on approach paths when operational levels warrant, and on departure paths when supporting rationale is provided. APZ-I defines all residential uses as clearly incompatible.

The area beyond APZ-I is the Accident Potential Zone II (APZ-II). This zone has a measurable potential for aircraft accidents and is normally used whenever an APZ-I is required. APZ-II allows single family dwellings, depending on density of structures and people.

Land use restrictions for accident potential zones are based on guidelines provided in the Department of Navy instruction OPNAVINST 11010.36 as shown on Figure 5-10.

### 5.11.2 Existing APZ

Existing APZ's in and around the project area have been studied by the U.S. Navy as part of the air installations compatible use zone (AICUZ) plan for the Naval Air Station at Barbers Point (U.S. Navy, 1984). The AICUZ presents data for the project site based on flight track data for the Southeast Quadrant of NAS Barbers Point and designates APZ-I and APZ-II for the air station. Figure 5-11 depicts areas designated by the Navy as clear



FIGURE 5-10

(1 of 2)

## LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES

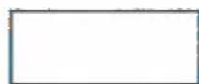
LAND USE CATEGORY	COMPATIBILITY <sup>1</sup>		
	Clr. Zone	APZ-I	APZ-II
<b>RESIDENTIAL</b>			
Single Family	4	2	2
2-4 family	4	2	2
Multi-family dwellings	4	2	2
Other residential	4	2	2
<b>TRANSPORTATION, COMMUNICATIONS &amp; UTILITIES</b>			
Highway and Street right-of-way	4		
Auto parking (Long-term)	4	3	
Communication	4	3	
Utilities	4	3	
Other trans., commun., and utilities	4	3	
<b>COMMERCIAL/RETAIL TRADE</b>			
Wholesale trade	4		
General merchandise-retail	4		
Food-retail	4		
Automotive, marine, aviation-retail	4		
Apparel and accessories-retail	4		
Furniture, homefurnishing-retail	4		
Eating and drinking places	4		
Other retail trade	4		
<b>PERSONAL AND BUSINESS SERVICES<sup>5</sup></b>			
Finance, insurance and real estate	4		
Personal services	4		
Business services	4		
Repair services	4		
Professional services	4		
Contract construction services	4		
Indoor recreation services	4		
Other services	4		
<b>PUBLIC AND QUASI-PUBLIC SERVICES</b>			
Government services	4		5
Educational services	4		
Cultural activities	4		
Medical and other health services	4		
Non-profit organization, incl. churches	4		
Other public and quasi-public services	4		
<b>OUTDOOR RECREATION</b>			
Playgrounds, neighborhood parks	4		
Community and regional parks	4	6	6
Nature exhibits	4		
Water-based recreational areas	4		
Entertainment assembly	4		
Other outdoor recreation	4	6	
<b>RESOURCE PRODUCTION, EXTRACTION AND OPEN LAND</b>			
Agriculture (except livestock)	4		
Permanent open space	4		
Water areas <sup>6</sup>	4		

Reference: OPNAVINST 11010.36, May 25, 1979

Clearly  
CompatibleNormally  
CompatibleNormally  
IncompatibleClearly  
Incompatible

continued. . .

FIGURE 5-10 (continuation)



Clearly  
Compatible



Normally  
Compatible



Normally  
Incompatible



Clearly  
Incompatible

CLEARLY COMPATIBLE:

Exposure to accident potential is such that the activities associated with the land use may be carried out with essentially no interference or substantial loss of life and property.

NORMALLY COMPATIBLE:

Exposure to accident potential is great enough to be of some concern, but density of people and structures, when properly planned, will allow the accident potential environment to be acceptable.

NORMALLY INCOMPATIBLE:

The exposure to accident potential is significantly more severe so that unusual density restrictions are necessary for safety of life and property.

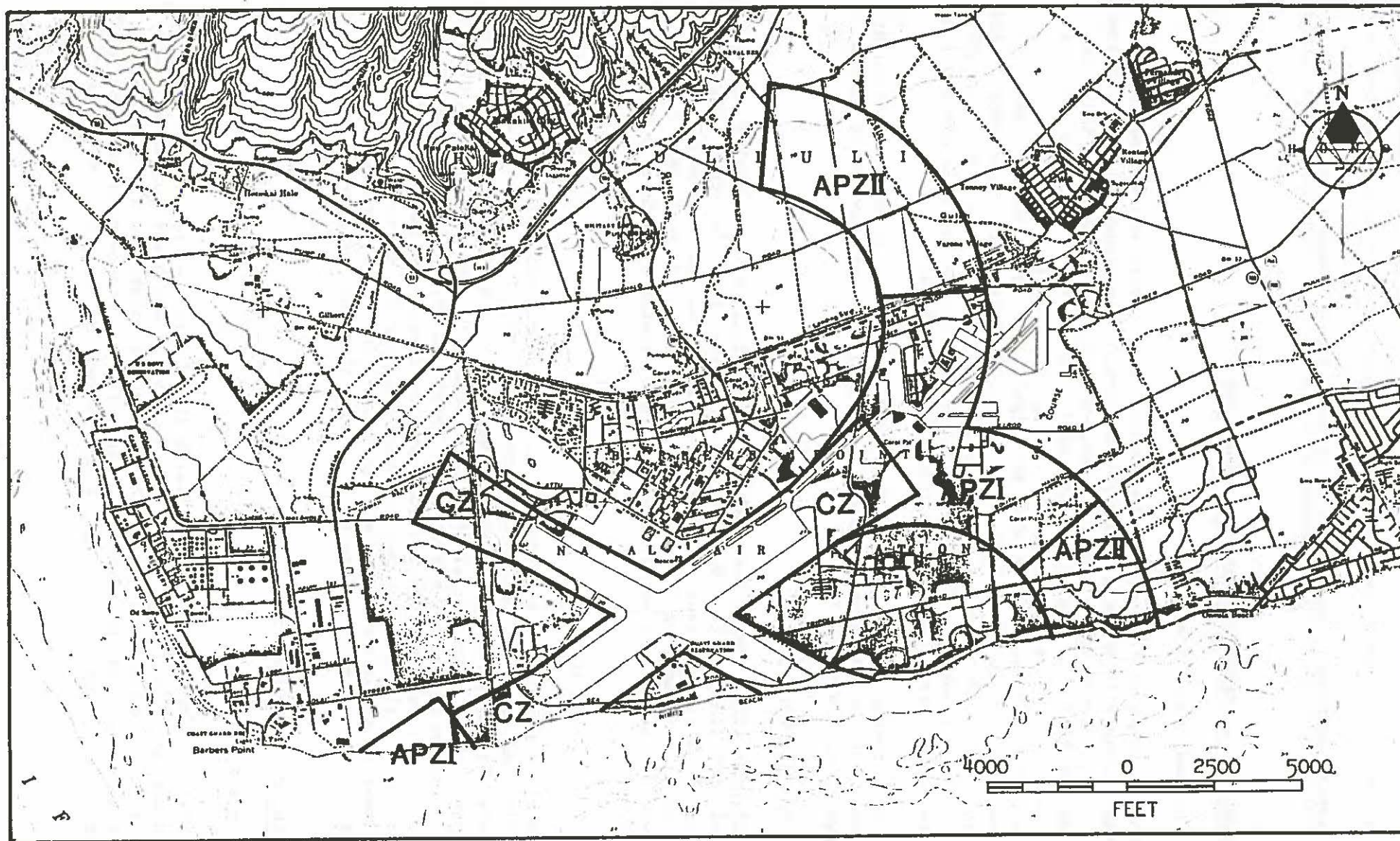
CLEARLY INCOMPATIBLE:

The exposure to accident potential at the site is so severe, due to potential loss of life and property, that performance of land use activities is not advisable.

FOOTNOTES

1. Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures.
2. Suggested maximum density 1-2 dwelling units per acre, possibly increased under a Planned Unit Development (PUD) where maximum lot coverage is less than 20 percent.
3. No passenger terminals and no major above-ground transmission lines in APZ-1.
4. The placing of structures, buildings or above-ground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See NAVFAC P-80 for specific guidance.
5. Low-intensity office uses only. Meeting places, auditoriums, etc., not recommended.
6. Facilities must be low intensity.





## AICUZ ACCIDENT POTENTIAL ZONES

REFERENCE: USGS TOPOGRAPHIC MAP, 1968  
U.S. NAVY, 1984, EXHIBIT IV-5



zones, APZ-I and APZ-II, and Figure 5-12 shows the proposed land use in these areas.

## 5.12 SURFACE TRANSPORTATION AND ACCESSABILITY

### 5.12.1 Highway Facilities

Highway access to the site is Fort Weaver Road. Fort Weaver Road has a full interchange with H-1 and a newly constructed interchange with Farrington Highway. Fort Weaver Road is a major four-lane divided rural arterial from H-2 to Renton Road and a two-lane undivided rural arterial from that point to Papipi Road. It is the only facility providing access from Ewa Beach, Iroquois Point, and the project site to Waipahu, Central Honolulu, Leeward Oahu, and Central Oahu. Access to Fort Weaver Road from the sugar cane fields and residential communities is currently provided by numerous plantation and minor collector roadways. Traffic signals along Fort Weaver Road are provided at intersections with Papipi, Iroquois, and Renton Roads.

The H-1 Freeway is a major facility with three lanes in each direction at the vicinity of the Kunia interchange. The major roadways providing access are shown in Figure 5-13.

### 5.12.2 Traffic Volumes

Existing traffic counts taken along various intersections during July and August of 1979 along Fort Weaver Road were obtained from the State Department of Transportation. The results of these counts taken for the morning and evening peak hours and for 24 hours of the day, adjusted to reflect school season volumes along Fort Weaver Road, are illustrated in Figures 5-14 and 5-15.

### 5.12.3 Transit Service

Current transit service to Ewa Beach and Iroquois Point is being provided by the City and County of Honolulu by Route 50. This route has three sublines which serve Iroquois Point, Ewa Beach, Ewa Mill, and Makakilo. Additional service is also provided to Waipahu. The route provides service from these areas via routes along Fort Weaver Road, Farrington Highway, Kamehameha Highway, and Dillingham Boulevard to major employment and shopping areas in Honolulu. Currently, three buses per hour are provided during the morning and evening peak hours to and from Honolulu in addition to the Ewa Beach express (Route 91) running (non-stop) twice in the morning and twice in the evening.

## 5.13 PUBLIC UTILITIES

### 5.13.1 Electricity and Telephone

Electricity for the Honouliuli Plains is generated at the Hawaiian Electric Company Kahe Plant, is transmitted to the Ewa Beach Substation, and is then transmitted through 46 and 12 KV circuits located on the road network adjacent to and around the mauka periphery of the proposed project. The 12 KV distribution circuits are on Papipi Road and Fort Weaver Road. The 46 KV



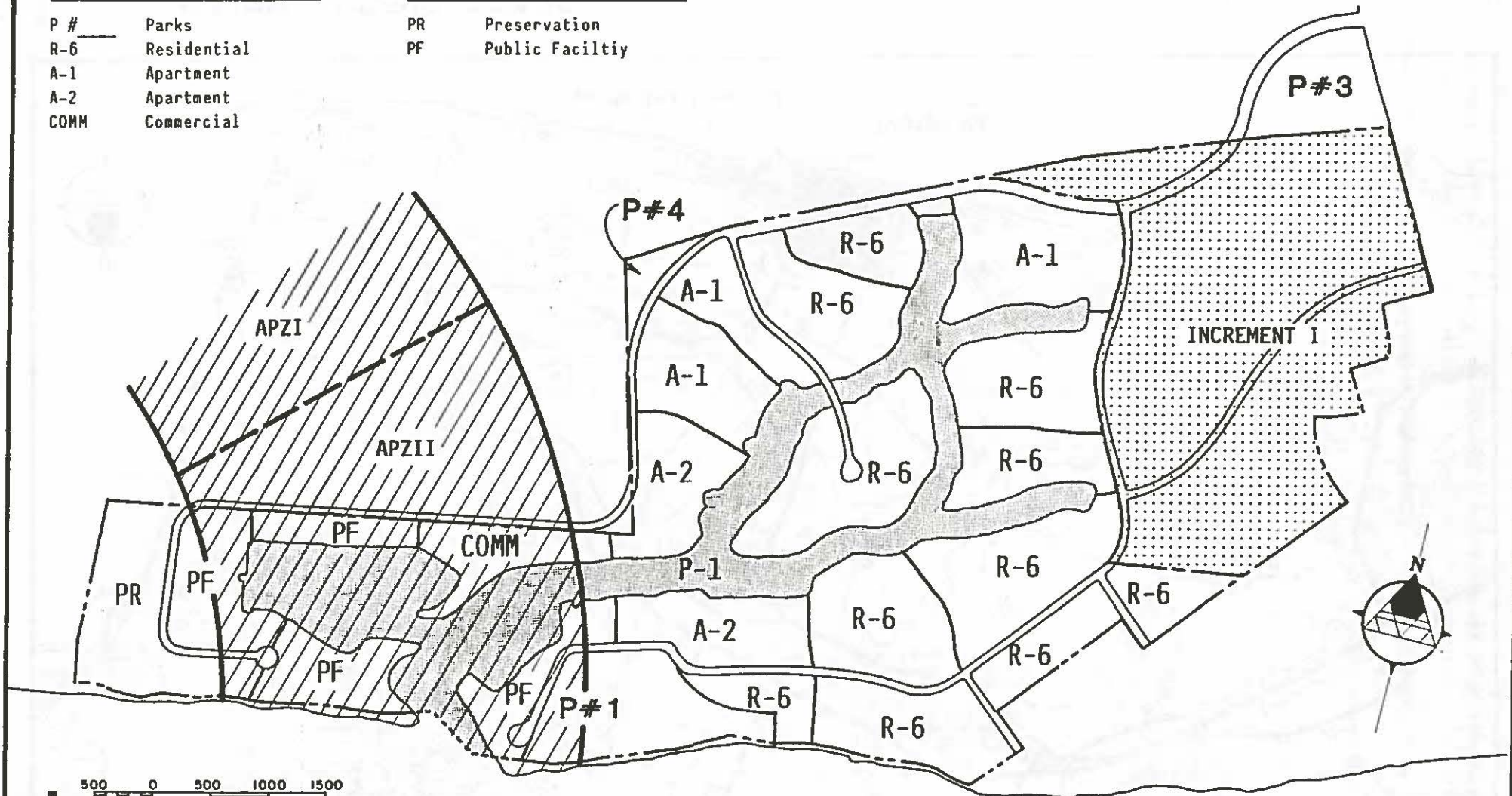
# HONOLULU CITY & COUNTY ZONES

P # Parks  
R-6 Residential  
A-1 Apartment  
A-2 Apartment  
COMM Commercial

## SPECIAL DESIGN DISTRICT CODES

PR Preservation  
PF Public Facility

5-65



DAMES & MOORE  
FIGURE 5-12

## ACCIDENT POTENTIAL ZONES VERSUS PROPOSED LAND USE

### INCREMENT II - EWA MARINA COMMUNITY

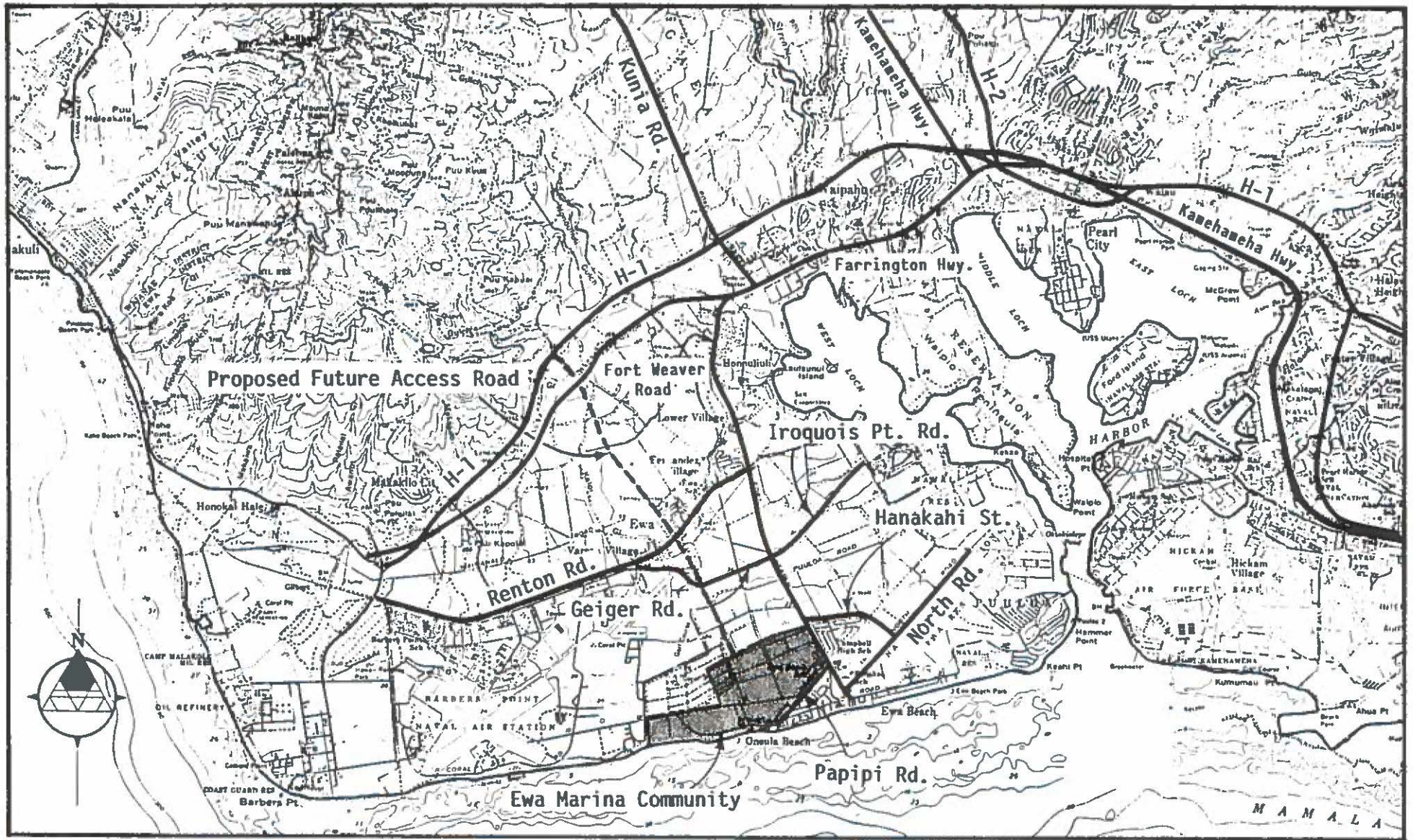
#### Reference:

MSM & Associates

Ewa Marina Community, Project Summary  
April 1985

Chief of Naval Operations, AICUZ Project Office  
Source of APZ's





# MAJOR ACCESS ROADS EWA MARINA COMMUNITY

5000 0 5000 10 000



## Reference:

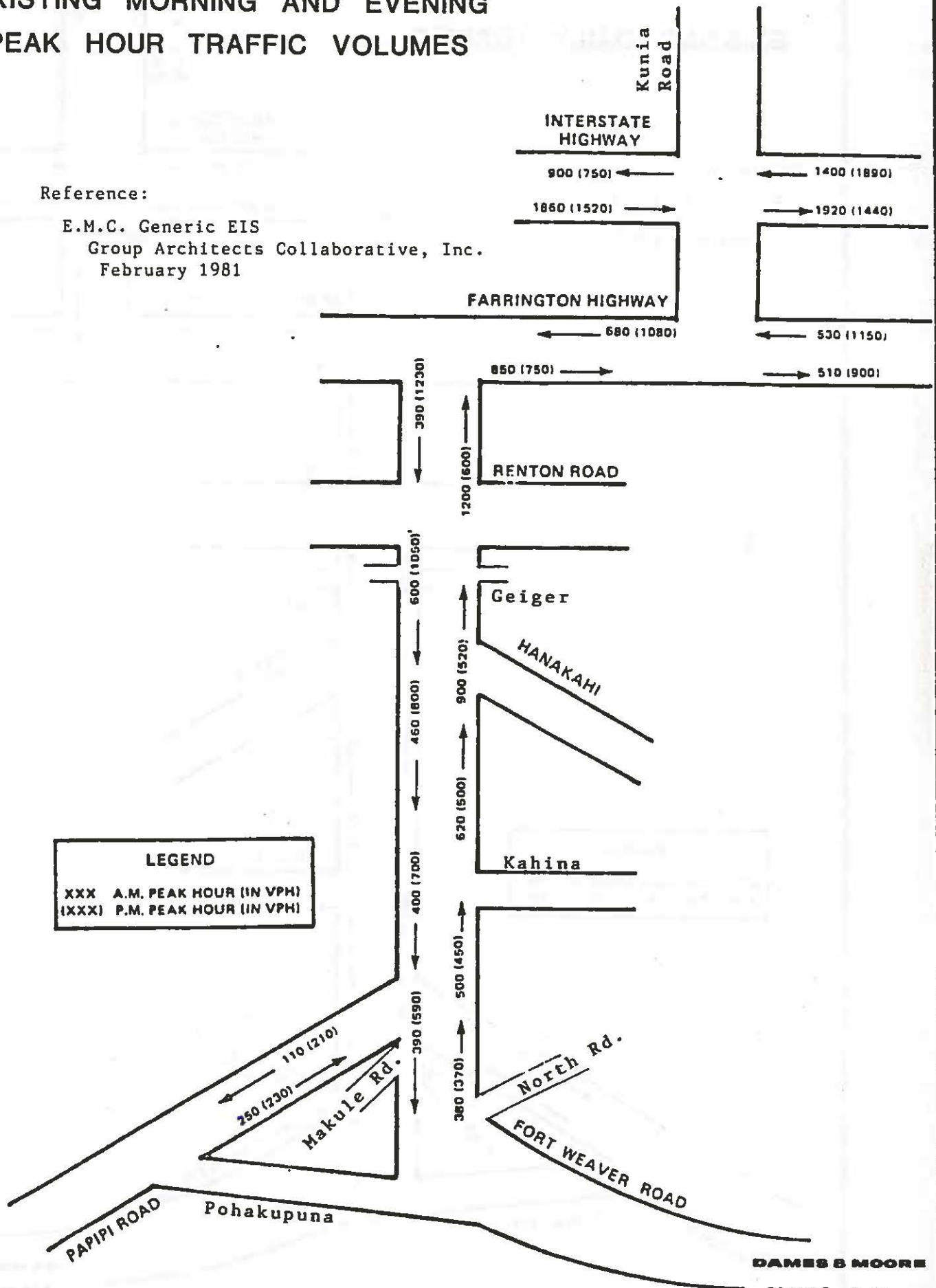
U.S.G.S. Topographic Map, Island of Oahu  
Dated 1954.  
Group Architects Collaborative, Inc.  
E.M.C. Generic EIS  
February 1982



# EXISTING MORNING AND EVENING PEAK HOUR TRAFFIC VOLUMES

Reference:

E.M.C. Generic EIS  
Group Architects Collaborative, Inc.  
February 1981



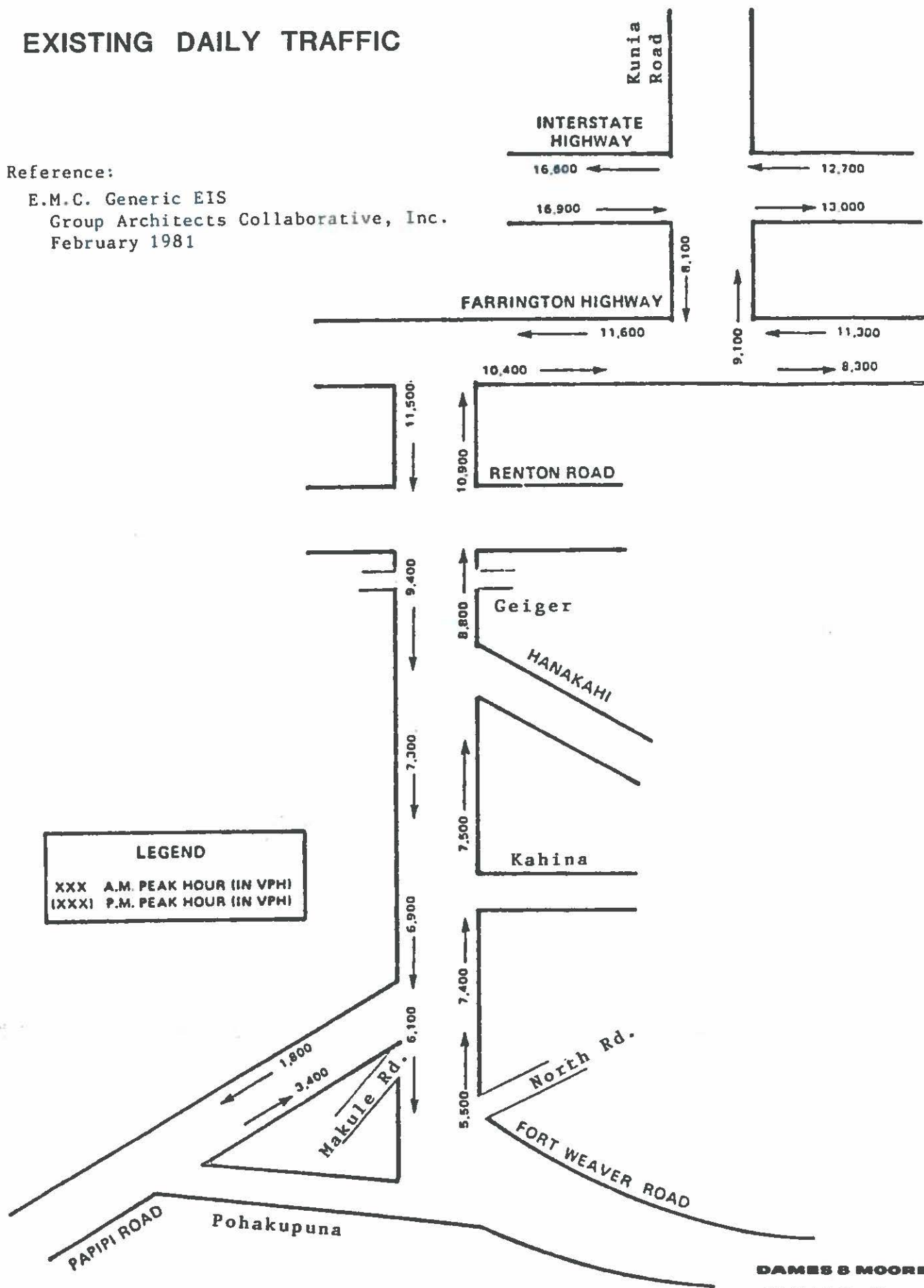
DAMES & MOORE

FIGURE 5-14

# EXISTING DAILY TRAFFIC

Reference:

E.M.C. Generic EIS  
Group Architects Collaborative, Inc.  
February 1981



DAMES & MOORE

FIGURE 5-15



transmission circuits are on North, Fort Weaver, and Navy Roads. Telephone service is provided by the Hawaiian Telephone Company (HawTel). There is presently no electricity or telephone service beyond Papipi Road and Oneula Beach Park.

#### 5.13.2 Water

The Pearl Harbor Basin, which includes the project site is designated a "Groundwater Control Area" by the State of Hawaii Board of Land and Natural Resources (BLNR). Because of this designation, the BLNR is responsible for all water extracted and used in Honouliuli Plains.

Present Water Use - The largest present service areas are Ewa Beach, Makakilo, and Campbell Industrial Park. Water is also exported to Nanikuli. All supply comes from the Board of Water Supply (BWS) wells in Waipahu, primarily from the Kunia 1 and Hoaeae wells. The Kunia 228 reservoir "floats" on the system to regulate pressure.

To supply the Ewa Beach community, there is a 16-inch pipeline that branches off the Farrington Highway main and runs the length of Fort Weaver Road. The station's record indicates peak flow in the 16-inch pipeline is about 5.5 mgd. Year-round average use is approximately 2.1 mgd. The Fort Weaver Road pipeline has no capacity to supply additional development.

Plan for New Sources of Supply - The Campbell Estate master plan provides for installation of new potable and non-potable wells to meet anticipated water requirements. Additionally, source development projects which BWS may undertake outside the Ewa area (the Waiau tunnel, for example) could ultimately provide some water in the later stages of project development.

#### 5.13.3 Gas

GASCO, Inc. of Pacific Resources, Inc. currently provides propane gas service to the Ewa Beach area. The existing main source of supply is from two 2,000-gallon tanks in a holding station located just east of the elementary school north of Papipi Road in Ewa Beach.

Gas mains two inches in diameter run from the gas holding station along Papipi and Fort Weaver Roads.

#### 5.13.4 Schools

The Ewa Beach community is presently served by schools located at the intersection of Fort Weaver Road and Papipi Roads. Existing facilities include: Ewa Beach Elementary School, Kaimiloa Elementary School, Pohakea Elementary School; Ilima Intermediate School, and Campbell High School. Enrollments at these schools have generally declined in recent years, particularly in the upper grade levels.

### 5.14 SOCIO-ECONOMIC CONDITIONS

Ewa Beach has a mixture of single-family and apartment homes, and a stable population which grew little during the 1970s. The community is oriented

toward job opportunities in Pearl Harbor and Honolulu, even though some of the residents presumably work in Campbell Industrial Park. Most of the residents have completed high school, but few have graduated from college.

#### 5.14.1 Socio-Economic Characteristics

The socio-economic indicators for the population of Barbers Point Naval Air Station indicate that residents are in the military or are military dependents. Ocean recreation is directed primarily toward military beaches on the south shore of the Naval Air Station, adjacent to the Ewa Marina Community site. Socio-economic data on the entire Ewa District is provided in Table 5-22.

#### 5.14.2 Commerce and Industry

Many of the developments in southwest Oahu are within Campbell Industrial Park. Established in the 1950s, the park occupies 1,341 acres and contains more than 90 light to heavy industrial activities. These provide more than 2,100 jobs for the area. The State's major energy facilities are within the park. These are the state's two refineries, Chevron USA, Inc. and Hawaiian Independent Refinery, Inc.; a waste oil recycling plant, Unitec Environmental Systems; and Texaco and Powerine Oil Company fuel storage facilities. Other activities there include one of Hawaii's two cement plants, a steel plant, manufacturing and storage companies, and a cattle feed lot. Facilities under construction or proposed for locations near the industrial park include the Barbers Point Deep Draft Harbor and the proposed West Beach Resort.

The Barbers Point Harbor, of which dredging is nearing completion, will be a second major deep-draft port of Oahu. It will cover about 330 acres and will include container, trans-shipment, overseas break-in-bulk, and one or two petroleum terminals. Construction is to proceed in three phases over 50-years, with construction employment expected to peak at 380 jobs during harbor and channel dredging and average about 280 jobs. The harbor is expected to generate over 400 direct employment opportunities by 1990 and to produce over 1,300 jobs by 2020. In addition, the harbor is expected to cause a leeward relocation of numerous businesses which currently depend on Honolulu Harbor. By the year 2030, harbor-induced expansion at the Campbell Industrial Park could double employment in the area to a total of about 4,200 jobs.

The proposed West Beach development will be located on 640 acres along the shoreline abutting and north of the new harbor. Planned as the largest resort area on Oahu outside Waikiki, West Beach would accommodate 17,500 visitors and residents in 5,500 hotel rooms and 1,700 residential units. The development is to include a 48-acre marina, recreational facilities, a commercial center, shopping centers, and associated infrastructure. An average of 940 construction workers will be required during the 20-year development period; once completed, operations and maintenance employment is expected to reach approximately 3,850 workers.

Considerable farming also takes place in the Ewa district, with most of the land in Ewa planted with sugarcane. Total employment at Oahu Sugar Company is about 800 people.



TABLE 5-22

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT:  
EWA DISTRICT

Item	Oahu	Ewa District	Ewa Town	Ewa Beach	Barbers Pt. NAS
Census Tracts			86.02	84	85
Resident Population:					
1980	762,565	23,797	4,653	7,643	2,942
1970	629,176	19,328	4,114	7,801	3,187
Percent Change (1970 to 1980)	21.2	23.1	13.1	-2.0	-7.7
Number of Males to 1,000 Females (1980)	1,057	1,112	1,051	1,034	1,431
Median Age (years, 1980)	28.0	25.6	28.5	24.8	21.7
Race (% , 1980):					
White	33.1	39.2	10.9	37.5	73.9
Japanese	24.9	11.6	19.3	11.8	1.5
Chinese	6.9	2.0	1.0	2.4	0.2
Filipino	12.8	25.8	53.7	20.8	11.5
Hawaiian	10.5	10.9	8.3	14.2	1.1
Other	11.8	10.5	6.8	13.3	11.8
Origin (%):					
Born outside Hawaii (1975)	41.2	47.5			
1970:					
Hawaii born	56.1	47.5	59.7	46.3	NA
Hawaii born of native parents	68.6	70.7	69.5	95.6	NA
Mainland born	26.8	37.2	3.0	43.2	NA
Foreign born	9.1	8.2	30.5	4.4	NA

NA Not applicable.

TABLE 5-22  
Continued

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT:  
EWA DISTRICT

<u>Item</u>	<u>Oahu</u>	<u>Ewa District</u>	<u>Ewa Town</u>	<u>Ewa Beach</u>	<u>Barbers Pt. NAS</u>
Census Tracts			86.02	84	85
Family Characteristics (%)					
Married, 14 & over:					
1975	62.4	72.0			
1970:					
Male	58.3	57.9	61.0	73.0	91.8
Female	62.7	70.8	63.1	72.8	94.0
Head of family (1970):					
Couple	86.7	90.0	85.4	91.0	95.5
Male	3.6	2.4	9.7	1.9	0.7
Female	9.8	7.7	4.9	7.1	3.8
Education:					
Completed High School, 18+ (%, 1975)	77.9	72.7			
1970:					
8 years or less (%)	20.8	18.5	58.8	13.6	NA
Completed High School (%)	37.5	41.9	28.6	73.0	NA
College or more (%)	15.5	13.2	3.8	11.4	NA
Median years of education	12.3	12.4	8.5	12.4	NA



TABLE 5-22

Continued

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT:  
EWA DISTRICT

<u>Item</u>	<u>Oahu</u>	<u>Ewa District</u>	<u>Ewa Town</u>	<u>Ewa Beach</u>	<u>Barbers Pt. NAS</u>
Census Tracts			86.02	84	85
Employment:					
In labor force (1970):					
Civilian, male	61.5	43.6	65.9	61.1	NA
Civilian, female	49.0	41.9	34.1	30.3	NA
Military	11.5	27.0	1.9	13.6	NA
Unemployed (%):					
1975, 16+ in labor force	7.5	3.4			
1970	3.0	3.3	4.3	4.0	NA
White collar (%):					
1975	30.8	21.0			
1970	26.5	21.2	7.6	24.6	NA
Industry (% , 1975):					
Agriculture	1.8	7.2			
Construction	9.5	7.5			
Manufacturing	6.9	14.4			
Government	22.3	33.4			
Income:					
Median family income (\$):					
1975	14,139	12,674			
1970	12,035	10,000 to 11,999	10,473	9,634	NA
Families below poverty level (%):					
1975	10.0	13.1			
1970	7.2	6.9	2.9	6.2	NA
Families above \$25,000 (% , 1970)	8.5	4.7	1.4	2.3	NA

TABLE 5-22

Continued

SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT:  
EWA DISTRICT

Item	Oahu	Ewa District	Ewa Town	Ewa Beach	Barbers Pt. NAS
Census Tracts			86.02	84	85
Housing:					
Vacant (% , 1980)	8.2	4.4	2.3	2.4	9.9
Persons/household:					
1975	3.43	4.13			
1970	3.60	4.17	4.24	4.17	3.45
Owner occupied (%):					
1975	47.8	45.1			
1970	45.0	51.4	0.4	54.1	NA
Median value of owner occ. (\$ , 1970)	38,400	25,000 to 34,000	--	29,200	NA
Median rent (\$):					
1975	197	150			
1970	130	120 to 149	40	160	114
Single family (%):					
1975	57.7	82.6			
1970	58.8	73.0	94.1	30.1	0.4
Over 1.51/room (% , 1970)	6.9	6.3	16.7	6.1	0.9
Condition (%):					
1975:					
Good	85.6	89.0			
Fair	11.5	9.8			
Poor	1.9	1.2			
1970:					
Lacking some plumbing	3.3	1.9	10.9	0.5	--
Lacking telephone	7.6	4.3	9.4	2.5	30.1

Source: Hawaii Dept. of Planning and Economic Development, 1981, State of Hawaii data book; a statistical abstract, 1981, DPED, State of Hawaii, Honolulu.



## 6.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

### 6.1 PHYSICAL IMPACTS

#### 6.1.1 Geological Impacts

Terrestrial. The topography in the project area will undergo extensive modification with the elevation of the residential areas and the excavation of the marina. This will involve increasing the existing topography to +20 feet above sea level in some locations from the existing +10 feet, and excavation of the existing topography from +10 feet to -8 to -15 feet.

The existing soil profile also will be affected by the grading and re-distribution of the soil and coral material. Dredged coralline material and sand will be placed throughout the development, as required by final grading plans. Existing topsoil will be stockpiled during the grading operations and used for final cover at every opportunity. Imported topsoil may be necessary for final cover, depending upon final grading contours and topsoil requirements.

Excavation for the marina will result in the conversion of 115 acres of terrestrial land to a marina.

The coastal configuration will be modified with the creation of an additional 4.9 miles of intertidal coastline along the perimeter of the marina. Construction of the breakwater will alter the land/sea profile with the addition of 4,200 square feet of land (rock). Creation of the entrance channel will result in the loss of 400 feet of existing shoreline.

Marine. Littoral processes are described in Section 5.8.2. Transport of sand is predominantly on-shore/off-shore; however, there is some longshore littoral transport during tradewind and southern swell. During trade winds, the sand is transported toward the west. The main function of the east breakwater is to keep sand on Oneula Beach and to prevent shoaling in the entrance channel. If sand should move into the channel, it would deposit just inside the breakwater, and backpassing would then be required. Some sand will be trapped on the east side of the breakwater. The breakwater would provide a definite barrier to the littoral drift and would have an favorable impact on the beach.

If it is found that the downdrift beaches are eroding over a long time period by an amount similar to the volume that has been accreting in the fillet trapped by the west breakwater, this material should be periodically removed and used to nourish the beaches where the erosion is occurring. Material can be bypassed by a land-based operation, a fixed operation like a jet pump, or a clamshell. This is not expected to be a problem at this site where pocket beaches with sand reservoirs exist.

Dredging of 128,889 square yards of bottom will be necessary for the creation of the entrance channel. The resulting change in bottom depth will vary from 0 feet to -12 feet to -15 feet to -20 feet below sea level (see Figures 4-12 and 4-13). Approximately 147,000 cubic yards of material will be removed. The depth at the makai end of the entrance channel is designed to



greatly reduce the probability of waves breaking in the channel and to allow passage of boats during periods of high surf.

#### 6.1.2 Hydrological Impacts

Groundwater Hydrology. Construction of the marina would have the effect of moving the shoreline inland approximately 5,000 feet , thus increasing salinities in the coral aquifer. The increase would be limited to the coral aquifer. Some irrigation wells may begin to produce more highly saline water. The consequences may be partly alleviated by the fact that lands within the project will be taken out of cultivation, thereby lowering irrigation pumping demand. The marina will not cause any direct loss of groundwater, but it will reduce the available groundwater storage volume in the coral aquifer.

Surface Hydrology. The project area is at the bottom of the extensive Kaloi Gulch watershed and represents the terminus of the watershed. Presently, the Honouliuli plain portion of the Kaloi Gulch watershed can be characterized as a sheet flow/percolation system which only occasionally discharges storm water directly into the ocean near Oneula Beach Park. The proposed project and other upstream projects will have the effect of revising this system to a channeling system with predictable flow-lines, and sub-watershed boundaries. Proper drainage design and execution will result in a more functional drainage situation and make a positive contribution to the near shore and marine environments by directing drainage to several locations rather than the existing single drainage point near Oneula Beach Park.

The amount of surface runoff generated by Increment II will be determined during the design stages of the project. Although the surface runoff will increase due to urbanized development of this area and subsequent increase in impermeable surfaces, the future drainage facilities will be designed to direct the drainage to the sea or marina. All major drain facilities such as major channels, streams, etc., will be designed to the peak flow design requirements in the City's Drainage Standards. All other local drainage facilities will be designed on the basis of a 50-year and/or 100-year recurrency interval storm.

The interception of sediment carried down the Kaloi Gulch will be achieved through the use of stormwater ponding areas within the greenbelt system, together with a 150-acre water retention basin upstream of the project area. Although the final retention volume has not yet been determined, it appears that a 150-acre basin could retain all of the Kaloi Gulch runoff from small storms, and that much of the impounded water would percolate into the ground. Benefits thus achieved would include diversion of suspended solids, oils, and often material contained in urban runoff as well as reduced frequency of marina water disturbance due to storms. Some groundwater recharge to the brackish upper aquifer also will occur.

The sand siltation basins will decrease sedimentation soil erosion presently caused by upstream agricultural operations.



Marine Water Quality. Nearshore marine water quality may be affected in the construction phase by the dredging of the entrance channel and construction of the breakwaters; and during the operational phase of the project by the mixing of marina waters with the nearshore waters.

Excavation of the inland portions of the marina will be completed before a channel is opened to the ocean, and hence marina excavation will not affect ocean water quality.

The dredging of the channel entrance and construction of the breakwaters will consist of removing about 414,000 cubic yards. Most of the material is sand, coral, and coral limestone. A hydraulic suction dredge with a cutterhead probably will be used for the dredging. Suction dredging usually causes little turbidity other than at the point of excavation because sediments are disturbed only in the immediate vicinity of the head, and much of the turbid water created is drawn into the dredge suction. If required to meet Hawaii Department of Health water quality standards, a silt containment curtain around the dredge area could be employed.

Placement of the rock for the breakwaters also has some potential for raising turbidity. The dumping of core material will wash turbidity into the water column. However, since the core material will be predominantly coarse rock, it is unlikely that an observable effect will be produced farther than 100-200 feet from the point of operations. If required to meet Hawaii Department of Health water quality standards, a silt containment curtain around the construction area could be employed.

Impacts of operation on the nearshore, offshore and within the marina will result from the impacts of the discharge of marina water to the nearshore waters. The prevailing marina water quality will depend on pollutant inputs, the tidal flushing and other dispersive mechanisms. Sources of water pollution include the boats themselves, storm water runoff and ground water exfiltration.

- o Storm drainage will be the major pollutant source to the marina. Concentrations of particulate matter in storm water depend on the nature of the watershed and are quite variable. From agricultural land, suspended solids generally occur at several hundred milligrams per liter. With the use of the desilting basin suspended solids may not exceed 100 mg/l. Storm drainage from the Ewa Marina Community will be collected and discharged into the marina channels. Anticipated concentrations of suspended solids, nitrogen and phosphorus entering the marina from Kaloi Gulch and the developed area during an 8-inch storm are presented in Table 6-1.
- o The net groundwater flow reaching the ocean in the area of the proposed marina has been calculated and the irrigation well water analyzed. Based on groundwater influx rates, the circumference of the marina and irrigation well water composition, groundwater exfiltration to the marina will input an estimated 105 pounds/day of nitrogen and 2 pounds/day of phosphorus, both of which are nutrients for phytoplankton.

TABLE 6-1

ESTIMATED STORM DRAINAGE INPUTS

Constituent	Kaloι Gulch		Local Drainage	
	mg/l	lb/8" Storm	mg/l	lb/8" Storm
Suspended Solids	100	98,000	750	69,000
Total Nitrogen	6	6,000	2	550
Total Phosphorus	0.25	240	1	275
C.O.D.	25	25,000	50	14,000
Oil	5	5,000	10	2,800
Lead	0.1	100	0.3	80
Zinc	0.1	100	0.3	80

Reference MSM Programmatic EIS



- o Water quality conditions in the marina channels principally will depend on how long suspended solids and plankton remain within the marina. This "residence time" has been determined, and is a function of currents, tidal flow, and marina design. Currents, due to wind blowing over the water surface, have been calculated. Portions of the waterway system aligned with the prevailing tradewinds would be considered as perfectly mixed. Channels B, C1, C2, and D are aligned with the wind. The calculated flow in this section, due to a longitudinal wind component of 7 knots, is about 100 cfs and the time for a complete passage of water down the surface of the channels and back along the bottom is less than 2 days. Tidal flows would transfer water between adjacent channels. Tidal flows were computed on the basis of one 2-foot tide per day. Exchange flows were computed as the tidal prism volume passing from one basin to another and converted to cubic feet per second. From this information, the residence times throughout the system have been calculated. The mean residence time is defined as the expected time for a particle of water, initially positioned at some location, to reach the open ocean. Results are given in Table 4-1. The longest residence time (head of Channel H) is 12.1 days.
- o Boat heads and galleys can contribute organic matter and bilges can contribute oily waste. However, Federal regulations require marine sanitation devices on all boats equipped with toilets. In most cases, compliance is achieved by means of holding tanks which can be pumped out at dockside stations. Federal regulations prohibit the pumping of bilges. Vessels will be prohibited from discharging wastes into the marina and at least one pump-out station will be provided at a convenient location in one or more of the public mooring areas.

Effects of the marina water quality on nearshore quality will be small, and in some respects, beneficial. All of the nitrogen carried into the marina with the groundwater flow is reaching the ocean directly at the present time. Storm runoff to the ocean will increase somewhat because of the development's impervious surfaces, but the amount of silt and nutrients will be reduced by sedimentation in the Kaloi Gulch retention basin and the marina itself. The concentrations of suspended solids, plankton, and nutrients occurring in the marina channel entrance will dilute slowly as the plume is drawn out by the littoral current, thus minimizing nearshore impacts.

A more complete discussion of the water quality parameters discussed above is found in Section 9.1.4.7 Operation Impacts in the Programmatic EIS. In addition, Appendix B provides information on marina flushing and other marina design considerations.

### 6.1.3 Air Quality Impacts

Increment II of Ewa Marina Community will result in emissions of Carbon Monoxide, Nitrogen Dioxide, Sulfur Dioxide, Hydrocarbons, Particulate Matter, and Lead from motor vehicles, power boats, electrical generation, and solid waste incineration.



Construction. Air quality impacts resulting from construction activities at the proposed project site result from fugitive dust emissions associated with earth moving activities and the use of various internal combustion engines. Fugitive dust emissions will be reduced through the use of water sprays. These water sprays should allow the project to meet federal and state air quality standards for fugitive dust emissions.

Operation. The air quality impact of the proposed project has been previously analyzed in reports by Morrow (Morrow, 1979) and Root (Root, 1979). These documents have been incorporated into the previously prepared Programmatic EIS and Supplemental EIS for Increment I. Information in this section presents a summary of data presented in these reports.

Air pollutant emission sources associated with the proposed project can be summarized into increased motor vehicle use, power boat activity in the proposed marina, electric power use by the proposed residents of the new community, and the potential use of incinerators to eliminate the solid wastes generated by the proposed new community. A summary of the proposed total emissions associated with the proposed development are shown in Table 6-2. These data indicate that nitrogen oxide emissions comprised the largest quantity of emissions associated with the proposed project.

The overall conclusion of the previously generated studies have indicated the following:

1. The proposed project will result in an increase in air pollutant emissions in the project area. Project-generated traffic will offset a projected decline in automotive emissions which would have otherwise occurred due to the federal motor vehicle emission control program; thus, there will be little change or a net increase in most pollutants. Lead will decline sharply despite increased traffic due to the federal program for phasing out leaded gasoline.
2. Air quality modeling has been used to estimate the air quality impact associated with the proposed project emissions. These calculations have indicated that the proposed project has the potential to exceed the HAAQS for CO in the vicinity of the eastboard on-ramps to the Farrington Highway and H-1 Freeway. These exceedences would most likely occur during the morning peak-hour traffic under adverse meteorological conditions of very stable atmospheric conditions and low wind speeds. However, the analyses of the H-1 Freeway indicated that the HAAQS for CO may be exceeded without the proposed project.

Odors from the Honouliuli WWTP. A properly operating WWTP creates no obnoxious odors that can not be dissipated within a reasonable distance of the plant (usually the plant boundaries). The Honouliuli WWTP is approximately 5,000 feet from the closest boundary of the Ewa Marina Community. Under prevailing tradewind conditions, infrequent obnoxious odors should dissipate before reaching the Ewa Marina Community.

#### 6.1.4 Hazards

Tsunamis and Flooding. Past tsunamis, such as those mentioned in Section 5.8.2, appeared as a rapid rise and fall of sea level. An urbanized



**TABLE 6-2**

**Estimated Annual Emissions  
Ewa Marina Community  
1992/1996**

<b>Pollutant</b>	<b>Emissions (tons per year)</b>
Carbon Monoxide (CO)	4800 (1.8) <sup>a</sup>
Nitrogen Oxides (NOx)	5700 (9.1)
Hydrocarbons (HC)	630 (0.9)
Sulfur Oxides (SOx)	4000 (3.2)
Particulate Matter (PM)	370 (1.0)
Lead (Pb)	193 <sup>b</sup>

<sup>a</sup> Percent of 1978 Oahu Inventory

<sup>b</sup> Lead emissions in pounds per year

**Percentage Contribution of Emission Sources  
Ewa Marina Community**

<b>SOURCE</b>	<b>CO</b>	<b>NOx</b>	<b>HC</b>	<b>SOx</b>	<b>Pb</b>	<b>PM</b>
Motor Vehicles	86.6%	9.4%	81.4%	1.6%	99.0%	45.1
Power Boats	0.5	0.4	1.5	neg	neg	neg
Electrical Generation	4.9	89.6	8.0	97.7	neg	54.0
Solid Waste Incinerator	7.9	0.6	9.1	0.7	neg	0.9

Source: Morrow (1979)

area close to the shore could therefore suffer damage due to inundation, but probably not structural failures caused by impact forces. Flood level maps for the Hawaiian Islands have been prepared by the U. S. Federal Insurance Administration (see Figure 5-4). For most of the coastline, including the Ewa area, the controlling criterion is a tsunami event of a 100-year return period. The maximum runup elevation does not exceed +9 feet (MLLW) anywhere on the property, and maintaining the floors of all buildings above +10 should limit the risk of inundation damage to an acceptable level.

When marinas are subject to waves of long periods induced by tsunamis, the marina basin may act as an amplifier of the oscillations. Resonance occurs when the frequency of the tsunami corresponds to the natural frequencies of the basin. Natural frequencies of the basin depend on its dimensions and the size of the entrance relative to the width of the basin. Resonance characteristics of the marina waterways may tend to amplify water level fluctuations near the inland ends of finger channels. Numerical calculations were carried out on a simplified version of the proposed plan in which the side branches were neglected. The forcing function used at the marina entrance was the tide gage record from Honolulu Harbor during the 1960 tsunami, which produced a maximum water elevation at that point of 4.1 feet MLLW. The corresponding maximum calculated for the upper end of the marina (at the embankment over Kaloi Gulch) was 7.5 feet. It thus appears that tsunami surging may be amplified by as much as a factor of two, and should be allowed for when locating structures and designing boat docks. Peak flows near the marina entrance were computed at around 45,000 cfs, which translates to a current velocity of 5.5 knots. Approximate tsunami runup in the marina is shown on Figure 5-4.

Additional information on tsunamis is presented in Appendix B, Marina Design Considerations.

Accident Potential Zone. Proposed public facilities are located within the Accident Potential Zone II. However, commercial or retail uses determined by U.S. Army regulations as being "normally incompatible" within an APZ II will not be allowed in this zone.

#### 6.1.5 Acoustical Impacts

Construction. The major effort during the first two years of the construction period will be devoted to clearing the Project Area; excavation for the Marina and siltation basin, breaching the shoreline, excavation and dredging of the entrance channel, construction of breakwaters; the installation of utility systems; and the building of roads. The majority of the excavation effort can be accomplished by heavy equipment rather than blasting. When blasting is necessary, the impact would be minimized by the control of the size of demolition charges, using delay fuses, the incorporation of "blasting blankets," and controlled demolition times. The excavation effort is not expected to generate a significant noise impact in the Project Area for the following reasons:

- o The nearest residence to the major excavation area are approximately one-half mile distant.
- o The prevailing tradewinds will assist in carrying noises out to the sea.



- o All construction activities must conform to the provisions of Title II, Administrative Rules Chapter 43, "Community Noise Control for Oahu," and Chapter 42, "Vehicular Noise Control for Oahu," developed by the State Department of Health.

Operation. The impacts of the proposed project on existing sound levels has been discussed in previous reports (Ewa Marina Programmatic EIS; Increment I Supplemental EIS). Information contained in these documents will be summarized in this section.

The major source of noise associated with the proposed project will result from motor vehicle and power boat usage in the proposed development area. Design measures within the proposed community will be used to mitigate noise generated. Primary mitigation measures will include green belts, earthen berms and landscaping to prevent unacceptable noise intrusion.

The primary concern associated with sound levels in the project area is the result of existing aircraft activity. This presently occurs over the proposed project site as a result of operations at the Barbers Point Naval Air Station and Honolulu International Airport. Judicious land use planning has resulted in placement of open space in the areas which are anticipated to be most affected by the aircraft activity. This includes the commercial/public facility in the western portion of the marina. Residential land use is proposed in the areas less affected by aircraft noise.

Both the Navy and the Campbell Estate AICUZ acoustic data indicate that Ldn sound levels at the proposed residential sites of the Project Area do not exceed Ldn 65. This is within the normally acceptable U. S. Department of Housing and Urban Development (HUD) range of Ldn 55-65. Dwellings within a 60-65 Ldn contour would generally have interior noise levels of 51-56 Ldn with windows open and levels of 40-45 Ldn with windows closed. Window closure and air conditioning of selected rooms such as, bedrooms are possible means of achieving interior levels of 45 Ldn. (Ewa Marina Community Generic EIS, 1981).

Increased traffic caused by Ewa Marina Community also will increase ambient noise levels. Fort Weaver Road is the major access to the Project Area. The housing area east of Fort Weaver Road currently is subjected to both noise and pollution created by vehicular traffic. The completion of Ewa Marina Community will create a significant increase in traffic; however, the internal roadway system is designed to draw traffic into the development via the planned northern road which would intersect Fort Weaver Road at the northern part of the project area, to the north of most of the present housing (Figure 5-12). This will reduce traffic-generated noise caused by the project along Fort Weaver Road. Traffic noise within the community will be reduced by control of vehicular speeds; use of greenbelts, berms and landscaping.

Ewa Marina Community will be a focal point for regional recreational activities on Leeward Oahu. The availability of Marina waterfront, the 30-acre Oneula Beach Park, moorings for power and sail boats, swimming, surfing, and other recreational areas will generate a variety of recreational noises. Major recreational noises in the project area will include the operation of power boats along the Marina and entrance channel, and group recreational activities.



Boat speeds would be rigidly enforced by the Harbor Master. The prevailing winds normally will carry the noise out to sea, however, with onshore or no winds the noise could be noticeable during heavy use periods. The site orientation and elevation of residential design and commercial structures, coupled with the buffer distance afforded by roadways, marina docks, and the green belt systems will reduce the noise impact.

Through facility design, noise from equipment such as air conditioning/ventilation units, generators, compressors, pumps, and exhaust fans will be attenuated to meet the allowable noise levels of Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu.

## 6.2 BIOLOGICAL IMPACTS

### 6.2.1 Terrestrial Impacts

Flora. Except for the narrow zone of littoral vegetation, the land corresponding to Increment II is composed of plant communities dominated by introduced species. Of the approximately 111 species recorded during the present survey and the one done by Char (1980), only 24 are native. Of these 24, only five are endemic, and none are proposed by the Federal Register (1976) for classification as a rare or endangered species. Consequently, development would not impact this classification of plant species.

There will, however, be some negative impact on the plant communities. The Prosopis forest serves as a windbreak which protects the inland vegetation from the salt spray, and kiawe trees are valued for their wood which is harvested for making charcoal and for cooking at luaus. These impacts are relatively minor, because the forest is on private land and the harvesting is probably for the most part unauthorized, and the adjacent cane fields which benefit most from the forest buffer will be phased out. No native birds are known to use this forest.

The Batis swamp, although almost entirely dominated by the introduced pickleweed, is of some value to native birds. The American Golden Plover and Black-crowned Night Heron are known to use the marsh on occasion, and the site is at least suitable for casual use by two endangered birds, the Hawaiian Stilt and the Hawaiian Coot, although neither has been reported there. The swamp, however, has been designated preservation by the developer and will thus remain intact.

The littoral strand, which is the only native plant community at the site, is also of some value. In the present survey and the one by Char (1980), a total of eleven native species were recorded occurring in this community. Three of these were reported in 1980 to be rare at the site, and could not be found during the present survey. Moreover, most of this zone is highly disturbed by a road and the activities of fishermen and trash dumpers. Because of this disturbance and the fact that the native species are not endangered and are found in other similar habitats in Hawaii, the development of this area will not have a significant impact on their populations.



Fauna. The proposed development will have no major negative impact on the fauna. Nearly all of the birds reported from the site are exotic: the native ones reported only use the littoral strand and Batis swamp. With the exception of the five indigenous birds, all the other birds, mammals, and amphibians are exotic and widespread elsewhere on Oahu.

#### 6.2.2 Marine Impacts

Construction. Dredging for the entrance channel will result in the direct removal of approximately 128,889 square yards of benthic substrate with a concomitant temporary loss of the flora and fauna of the area. However, this loss is considered to be relatively minor due to low coral development and sand cover resulting in a low dependent fish population. The algae present does provide a food source for herbivorous fishes. After completion of dredging activities recolonization is expected to take place and the algae cover present at the existing deeper depths (~15 feet) will probably return throughout the channel at the same 10 to 20 percent algae cover. Algal cover and composition would be a function of substrate, wave action, grazing pressure, as well as depth. The anticipated turbidity created during the dredging activities will be minor and short term (about 6 months). The area experiences elevated natural turbidity and the increase caused by construction should be a minor addition. If required, a silt curtain could be used to reduce the area affected by the dredging activities. Use of a hydraulic cutterhead dredge mitigates the turbid affects of dredging at the source.

Ciguatera is a health hazard associated with eating fish contaminated with high levels of ciguatoxin. Ciguatoxin is produced by the dinoflagellate, Gambierdiscus toxicus, which is found to be epiphytic on certain species of benthic algae. It is hypothesized that fish become toxic when they ingest the algae. Outbreaks of ciguatera may be associated with disturbances of the benthic substrate during dredging. However, many dredging operations over the years have failed to result in or be associated with an outbreak of ciguatera. If required, the concentrations of Gambierdiscus toxicus could be monitored during construction as an indicator of possible ciguatoxin increases.

Construction of the breakwaters will result in the direct loss of approximately 70,000 square feet of bottom substrate. This is considered to be a minor biological loss because the bottom in this area does not support a productive benthic community. The breakwater will also result in the addition of 2,800 linear feet of rocky habitat. This will enhance the vertical relief in the area and may attract fish species not presently found there.

Construction during marina excavation should not impact the marine environment because the entrance to the ocean will not be opened until the excavation is completed.

Operation. The creation of the marina will result in 4.9 miles of new intertidal protected shoreline habitat and 115 acres of benthic marine habitat and the water column created therein. In addition, there will be an unquantified amount of piling and dock habitat due to construction of the appurtenances associated with boat slips. This diversity of habitat will benefit the local fish population by providing new habitat types for fish where none previously exist.



Normal operations within the marina will result in minor amounts of fuel oils and lubricating oils incidentally being discharged into the waters. Because the marina is designed to experience mixing of the marina waters with the waters of the open ocean, these pollutants are expected to move out the channel entrance and undergo natural weathering. Therefore, the water column within the marina is expected to be well below toxic levels of any given pollutant. The discharge of boat sewage is regulated by State and Federal laws and regulations, and raw sewage cannot be discharged from the boats into the marina waters.

Due to urbanized development of the project site, the surface runoff will increase and ultimately drain into the marina and then the sea or into the sea directly. Mixing of surface water runoff (with accompanying nutrients related to landscaping and agriculture) and marine waters may result in local periodic stimulation of algal and phytoplankton growth and decreased dissolved oxygen levels (primarily bottom water). This condition is expected to be infrequent and unlikely to occur much more than at present from existing runoff. Marina flushing rates should be high enough to prevent adverse eutrophication. During large rain events there will be low salinity water flowing out of the entrance channel. Strong mixing will occur with the ocean waters and the effects are expected to be localized and minor.

Maintenance dredging (every 10 years) will accumulate an estimated total of 6,000 cubic yards of dredge material. During dredging operations, all bottom areas dredged will be disturbed; any existing benthic communities will be lost and the area subject to recolonization. In areas of high natural turbidity, the dredging activities will affect adjacent areas and although not directly affected by the dredging, some settling of fines could inhibit the biological communities. Disposal of the dredge material will be determined as a result of sediment bioassay analysis.

### 6.3 SOCIOECONOMICAL IMPACTS

#### 6.3.1 Land Use Impacts

Because no permanent dwellings presently exist on the project site, the project would not displace residential use, and because the use proposed by the project is predominantly residential, a major impact would be in its provision of new housing stock. About 3,578 housing units encompassing a range of types and prices are proposed in the project, as compared with approximately 3,000 housing units in the existing Ewa Beach Community.

Public recreational land use will increase from the existing City and County's 30-acre Oneula Beach Park to about 150 additional acres of waterway and land area accessible to the public for recreation.

About 64.9 acres of commercial land use will be created in the form of support facilities for the Community to include boat and land-oriented facilities. This will add to the existing approximately 3-acre commercial area at Ewa Beach Community.

Open space, though not actually land use, is considered by planners as part of the land use system. Most of the project site is currently



agricultural open space, and this will be altered as a result of placing structures on the site. About 30 percent of the site will be occupied by structures upon completion of Increment II.

Housing. Housing units provided by the project are expected to contribute to the viability of the Ewa Communities in terms of increasing the quantity and variety of housing choices in the area and providing a larger residential base for expanded and improved community facilities and programs such as parks and recreation, public transportation, commercial facilities, educational facilities, and professional services.

Loss of open space currently occupied by agricultural and other private recreation areas with limited accessibility and usability is expected to be mitigated by development of usable and publicly accessible open space in the form of boating waterways, parks, and waterfront perimeter parkways.

By the year 2000, the total housing requirement for Oahu is projected to reach 318.2 thousand units, a new increase of 97.3 thousand units over the 1979 inventory. After allowance is made for replacement of obsolete units and a modest vacancy rate, the total building requirement for the 21-year period is 115.6 thousand units.

A list of major residential developments (in addition to the proposed project) which could be reasonably expected in the area by 1990 are listed in Table 6-3. This list represents a total of 24,745 additional households. In addition, 1,340 units are planned for Increment I. The Increment II development will support a total of 3,578 units, subdivided into 16 residential development areas.

Given the continuation of strong demand for housing on Oahu from both permanent residents as well as second home buyers, the growing level of urbanization within the Ewa District Submarket, the historical performances of other major development programs, and the relative lack of competitive ocean front and environmental amenity-oriented developments; Ewa Marina Community should be able to achieve a market penetration of approximately 500 to 550 units per year over its development period without adversely affecting the housing market.

Agricultural. According to Oahu Sugar Company, the withdrawal of approximately 400 acres to accommodate a residential development will not have a major impact on their cultivation of approximately 18,500 acres of sugarcane on the Honouliuli Plain. The agricultural land currently under cultivation within the proposed site produces low yield (9.34 tons per acre) sugarcane primarily because of the high alkaline content of irrigation water. Prime agricultural land with better quality water normally produces in excess of 13 tons per acre of sugarcane.

Oahu Sugar Company has said that because of the historically lower yield per acre of the fields on the Ewa Marina Community site as compared with most other fields on the plantation, any reduction in Honouliuli production acreage would start with the project site fields.

TABLE 6-3

FORECAST OF MAJOR LAND USE CHANGES IN  
CENTRAL AND LEEWARD OAHU  
1978-1990

<u>Region</u>	<u>Additional Households</u>
North Shore	1,045
Wahiawa	0
Mililani	5,000
Waianae Coast	1,600
Makakilo	4,000
Village Park	1,750
Ewa Plantation	350
Waipio-Gentry	1,000 <sup>1</sup>
Ewa Village	7,000
West Beach	3,000
	<hr/>
	24,745

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Source: MSM, 1981

<sup>1</sup>With 120 acres for a light industrial park.



### 6.3.2 Oahu General Plan and Population Impacts.

It is estimated that, when fully developed, Increment II will contain 3,578 households which translates to approximately 11,500 people. The Oahu General Plan lists Ewa District as a secondary urban center and expects the area to contain 9 to 10 percent of Oahu's total population by 2005 A.D. The Department of Planning and Economic Development (DPED) estimates the total population of Oahu in 2005 A.D. to be 954,000. The population of Ewa District would then be 86,000. The present population of the area is 39,000. Thus the proposed project is in conformance with the Oahu General Plan.

### 6.3.3 Economical Impacts

Employment requirements of the proposed project may have significant impact on the current work force. During the construction period, about 9,900 new jobs would be generated. By the time Increment II is completed, there should be about 650 permanent jobs.

Judging by past experience of employment in similar impact areas, it is likely the response will be from interested local residents who qualify and are unemployed, underemployed or seeking a change in jobs, and young persons who might otherwise be forced to leave the area and seek similar kinds of employment elsewhere.

The Ewa Marina Community project will contribute to the regional inventory of public infrastructure and recreational amenity systems. Program financial studies indicate that a total of \$59 million in construction monies will be expended, distributed as follows:

Infrastructure	\$42.0 million
Amenity Systems	17.0 million

### 6.3.4 Impacts on Historical/Archaeological/Paleontological Resources

The Increment II development plan would eliminate 64 out of a total of 107 archaeological features recorded within the site. Some of the 64 features to be eliminated have been disturbed by modern land use and some are probably of modern origin and of no archaeological value. However, there are isolated areas where small shelters, habitation sites, and miscellaneous features survive intact. Some of these features are of significance for their research value and could contain material which can provide information about prehistoric and early occupation of the Ewa Plain.

The proposed development would preserve Site complexes 3201, 3202, and 3205, at the western end of the project. (See Figures 4-3 and 5-6). These features are among the most intact and least disturbed of any and comprise 43 features out of a total of 107 recorded in the Increment II project area (see Table 5-18).

In addition, after discussions and field trips with the State Historic Preservation Officer, the developer has offered to preserve Feature 3209A for public interpretation. This feature is relatively large (8 meters square) and most likely a burial.

Further research will be conducted on the Archaeological features to be impacted. Based on recommendations from the Department of Land and Natural Resources (DLNR), the following program has been developed.

Two copies of an Archaeological Mitigation Plan, including a comprehensive base map will be submitted to DLNR in a timely manner, so that any further recommendations for mitigation from DLNR can be completed by the developer and/or his consultant prior to the start of any construction activity for the proposed project.

Further research will involve the following:

1. Systematic test excavations of selected sites which are determined to be prehistoric or early historic.
2. Excavation of significant sites determined on the basis of the test results.
3. Dating of volcanic glass and charcoal as well as identification of midden material, particularly fossil bird bones.

In keeping with DLNR recommendations, sinkholes exposed during land clearing and grading will be excavated by an archaeologist, and minimally, 50 percent of sinkholes larger than one meter in diameter will be surveyed, mapped, and test pitted. Where fossil remains are found in these sinkholes, they will be excavated archaeologically. In the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings or walls are encountered during construction, the applicant shall stop work and contact the Historic Preservation Office at 548-7460 or 548-6408. Two copies of the monitoring report will be submitted to DLNR for review and comment in a timely manner.

#### 6.3.5 Aesthetical Impacts

The project will affect the aesthetic quality of two sites in that it will replace the cane fields and alter the narrow strip of beach. First, the project will replace the agricultural use with residential use, thereby altering the visual quality of the area. This site will contain well-designed homes of carefully planned and landscaped aesthetic quality and will represent more housing, commercial and recreational opportunities.

Second, the project will alter the existing configuration of the ocean boundary, with attendant changes to the area's aesthetic recreational value. The project will enhance the area's recreational value in that it will contain a marina, neighborhood and pocket parks and active and passive recreation centers, including tennis courts and football and baseball fields. The varied shoreline will also provide for fishing, surfing, swimming and diving. Further, the developers will work with the City and County of Honolulu in the implementation of the Development Scheme for Oneula Park.

Overall, the project will provide more opportunities in visual variety, housing, commerce and recreation - all of which will enhance the area's aesthetic qualities.



The aesthetic qualities of a region are those qualities which society finds valuable. These qualities are measured subjectively, depending on the current needs, mores, values and eyes of the beholder. Given the above changes to the aesthetic atmosphere of the area, the positive and negative aspects of the changes on the view of the area from the upland areas and the coastline will depend on the individual preference. The removal of the trash and abandoned cars in the area will most likely be positive to most individuals. Although altering the coastline with the creation of the breakwater will undoubtedly be negative to some individuals, the possibilities of increased access to the area for recreational opportunities will offset the loss of natural changes.

#### 6.4 IMPACTS ON SERVICES AND FACILITIES

##### 6.4.1 Roads and Traffic

Existing traffic counts taken along various intersections during July and August of 1979 along Fort Weaver Road are illustrated in Figures 5-13 and 5-14. Based upon previous traffic studies for the proposed Ewa Community, the following traffic generation rates can be estimated for Increment II:

Daily		24,411 trips/day
AM Peak	-In-	351 trips/hour
	-Out-	1,404 trips/hour
PM Peak	-In-	1,404 trips/hour
	-Out-	702 trips/hour

The geographic distribution of the traffic which would be attracted or produced by the development is dependent on factors such as places of employment, school locations, shipping and commercial areas, nearby dwelling units, and relative distances to these land uses. Based upon person-trip tables developed for the entire Ewa Community, estimates of the distribution of residential peak hour trips are as follows:

#### ESTIMATED DISTRIBUTION PERCENTAGES FOR EWA MARINA COMMUNITY TRIPS

Major Area	Percentage of Total Trips
Honolulu	53
Pearl City	5
Wahiawa/Mililani	8
Waipahu	10
Makakilo	7
Waianae Coast	2
Ewa Beach	15
Total	100

Northern traffic to and from the site would utilize Fort Weaver Road and would disperse to areas north, east or west of the project via the various ramps at the present Kunia Interchange with H-1, Renton Road, Farrington Highway and Kunia Road. An additional north-south road, running parallel to

Fort Weaver Road and connecting to Renton Road could be required near the completion of the development to accommodate the increased traffic flow.

Traffic circulation within Increment II of the proposed project will be within the main roadways provided by the developers (Figure 4-3). Additional circulation and access to residences will be provided within each parcel by the individual subdeveloper (Figure 4-2).

The timetable planned for the proposed project envisions an absorption rate which is sufficiently slow that the incremental traffic impacts would be less severe. The slow absorption would be accompanied by slow growth in traffic, permitting time for adjustments in travel patterns, especially for commuters, and for improvements to the street/highway network and the public transportation system. With the addition of the second north-south access road, the additional traffic generated by Increment II could be accommodated.

There are several mitigating circumstances which are likely to reduce the impact of the Ewa Marina Community Project traffic on the highway system, especially prior to the completion of the second north-south roadway.

With the completion of the Barbers Point deep draft harbor, there will be an increase in the commercial and industrial activity in West Oahu, especially at the Campbell Industrial Park. Because the analysis assumed minimum levels of employment at the industrial park, these changes would reduce the volume of traffic which would travel on Fort Weaver Road to Farrington Highway and H-1, thereby relieving the congestion levels at these two interchanges.

The bus patronage which currently exists was assumed in this analysis. As residential development continues and population densities increase, it is projected that bus ridership would increase. Increased transit usage is a logical expectation given future improvements to the bus system, increase costs to own and operate automobiles, increased congestion on highways, and measures to provide priority facilities for buses and car-pools.

In depth traffic studies were previously conducted for the Programmatic EIS and the Supplemental EIS for Increment I.

#### 6.4.2 Water Supply

Potable water is to be delivered to the site, and transmitted to project users in accordance with Board of Water Supply (BWS) standards at the developer's cost. The amount of potable water necessary will be reduced through the use of a dual water system providing both potable and non-potable water.

The potable water is provided for domestic use. The non-potable water is provided for irrigation and non-domestic use. The non-potable water will have higher salinity and total dissolved solids but will not otherwise have adverse health effects.

The projected potable and non-potable water demand is 1.723 million gallons per day (mgd) and 0.71 mgd, respectively. 2.0 mgd have been allotted to the BWS for drilling of new potable wells in the Honouliuli area. This source will be used for Ewa Plain developments. If the amount allocated



specifically to the Ewa Marina Community is less than the projected demand of 1.723 mgd, alternative sources of water supply would have to provide for the shortage. These alternatives could consist of one or a combination of the following:

- a. The capture of Waiau spring water
- b. Additional allocation of the 22.5 mgd of permitted use available in the Pearl Harbor Ground Water Control Area
- c. Reduction in export to the Waianae-Makaha area as wells are developed at Mahaka and Waianae.

These alternatives are also discussed in Section 4.6.2.

#### 6.4.3 Sewage Collection and Treatment

The Honouliuli Wastewater Treatment Plant will have an ultimate capacity of 51 mgd. The present capacity is 25 mgd and present flow is approximately 17 mgd. The remainder of the existing capacity is allocated for future development between Makakilo and Halawa (including the project area). The collection system and force main are to be designed and constructed according to City and County standards and dedicated to the public system. The locations of these force mains are depicted in Figure 4-19.

#### 6.4.4 Municipal Solid Waste Collection and Disposal

Increment II would generate approximately 8,000 tons per year of solid waste. The collection and disposal of the solid waste generated will be by private refuse companies and by the City and County of Honolulu's Department of Public Works. The cost to the City and County of Honolulu for collection and disposal is currently about \$50 per ton. This may change with the construction and operation of the garbage to energy facility planned by the City and County of Honolulu.

#### 6.4.5 Police Protection

As development progresses, the Honolulu Police Department has indicated it will provide the resources to adequately service the growing population. As part of the marina operations, a marina patrol could be formed to provide for security, safety, and environmental protection. The need for protection beyond that provided by the City and County of Honolulu will be assessed by the developer during final operations planning as the marina nears completion.

#### 6.4.6 Fire Protection

Due to rapid growth of the Ewa Community, a new fire facility in the Campbell Industrial Park and Ewa Tenney Village, and the relocation of the existing Ewa Beach Fire Station is under consideration. These projects were originally deferred beyond fiscal year 1986, but are now considered as higher priorities.

#### 6.4.7 Educational Facilities

Previously, Department of Education reported to the Department of General Planning that adequate facilities were available for student enrollment generated by the total overall Ewa Marina Community project.

#### 6.4.8 Recreation

Boating. The projected demand for marina facilities on Oahu includes three major sources:

- o Current unfilled applications at State harbors which is estimated at 1,050 requests;
- o A latent demand of a minimum of 500 slips which is precluded from the market at present due to inadequate facility supply; and
- o Projected annual growth in new demand, as derived from the expanding population base, higher household income, increased popularity of boating, and increased levels of tourism -- estimated at 200 slips per year, equivalent to the rate of demand growth between 1969 and 1979.

As of 1979, there was a demand for 1,550 slips; by 1986 this requirement could increase to 2,950 slips; and by 1990 it could reach 3,750 slips.

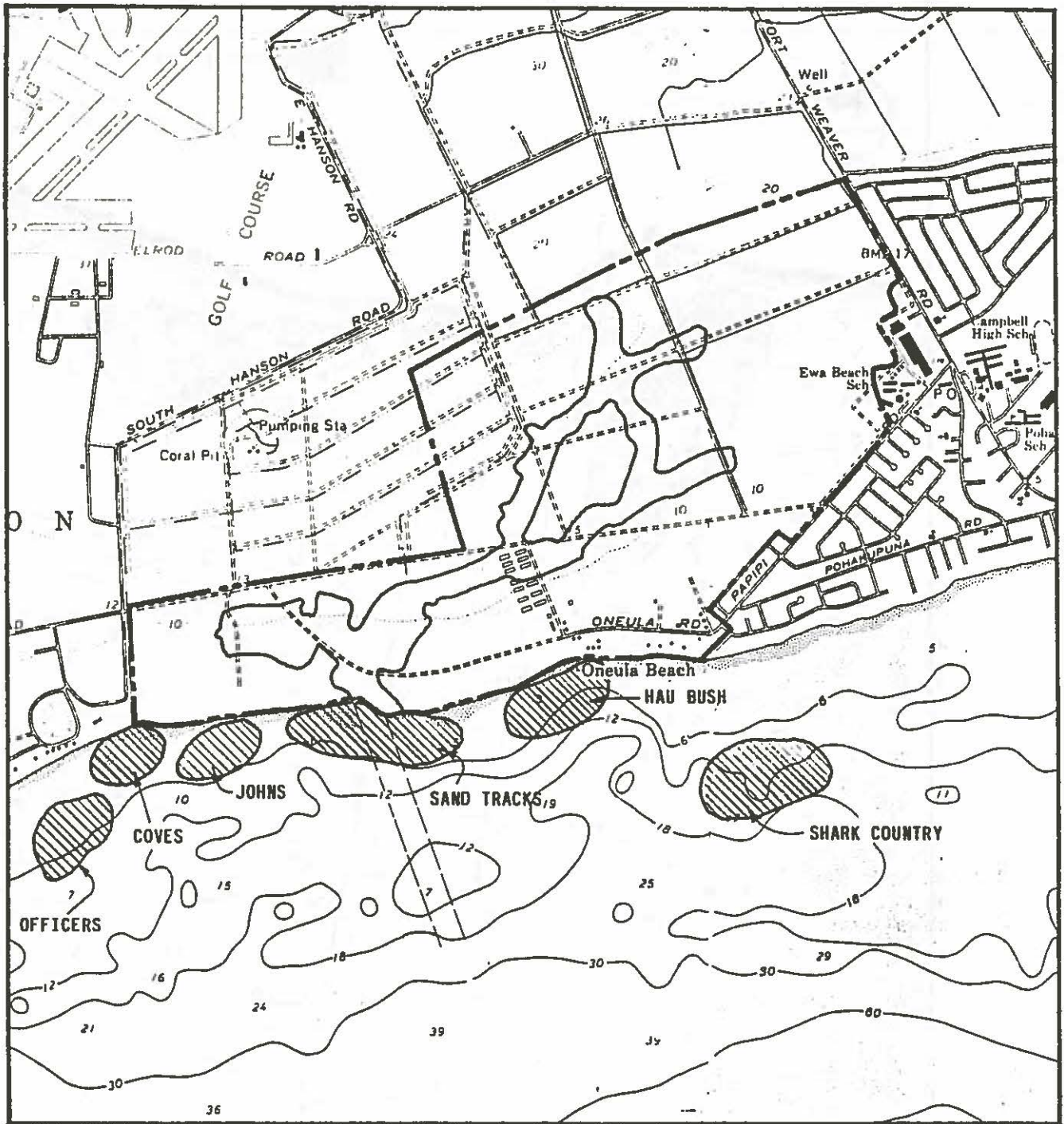
Given its relative location with respect to the major population center of Honolulu and to reasonably good ocean sailing conditions, the Ewa Marina development is in an excellent position to capture a substantial share of the projected increases in slip demand by 1990.

With installation of the marina, vessel traffic in the area will be increased to 1,600 boats at the time of project completion. Increased small vessel traffic close to the Pearl Harbor entrance could create safety problems due to interference with naval operations. The developer will contact the Navy regarding this potential problem.

Surfing. Six surf sites have been identified in the vicinity of the project site by Department of Planning and Economic Development (1971) SCORP Studies. The Division of State Parks, Outdoor Recreation and Historic Sites, Department of Land and Natural Resources, updated this study in an unpublished report "The Board Surfing Sites Survey" (Circa 1976). The six sites identified near the project site, shown in Figure 6-1, are Officers, Coves, Johns, Sand Tracks, Hau Bush and Shark County. The first five sites are located in water depths less than six to twelve feet and have surfable conditions under trade wind waves and southern swell with wave heights up to six feet. Shark Country is in deeper water, from 12 to 18 feet deep, and is surfable during southern swell with waves from 8 to 15 feet high.

In addition, surfing sites in the project vicinity were identified more recently (Moffatt & Nichols, 1985) using the method described by Walker (1972). Surf sites at a reef require a shoal with side channels to create a desirable peeling wave. By studying the bathymetry, surfing sites 1, 2, and 3 were identified as shown in Figure 6-2. Using this method only certain areas of the Sand Tracks site were identified as surfing sites. The entrance channel alignment was adjusted to minimize its impact on surfing at these locations. In fact, wave refraction due to the channel will tend to enhance surf Site No. 2, while Site No. 3 will not be affected. The west breakwater, however, will partially destroy surf Site No. 1.





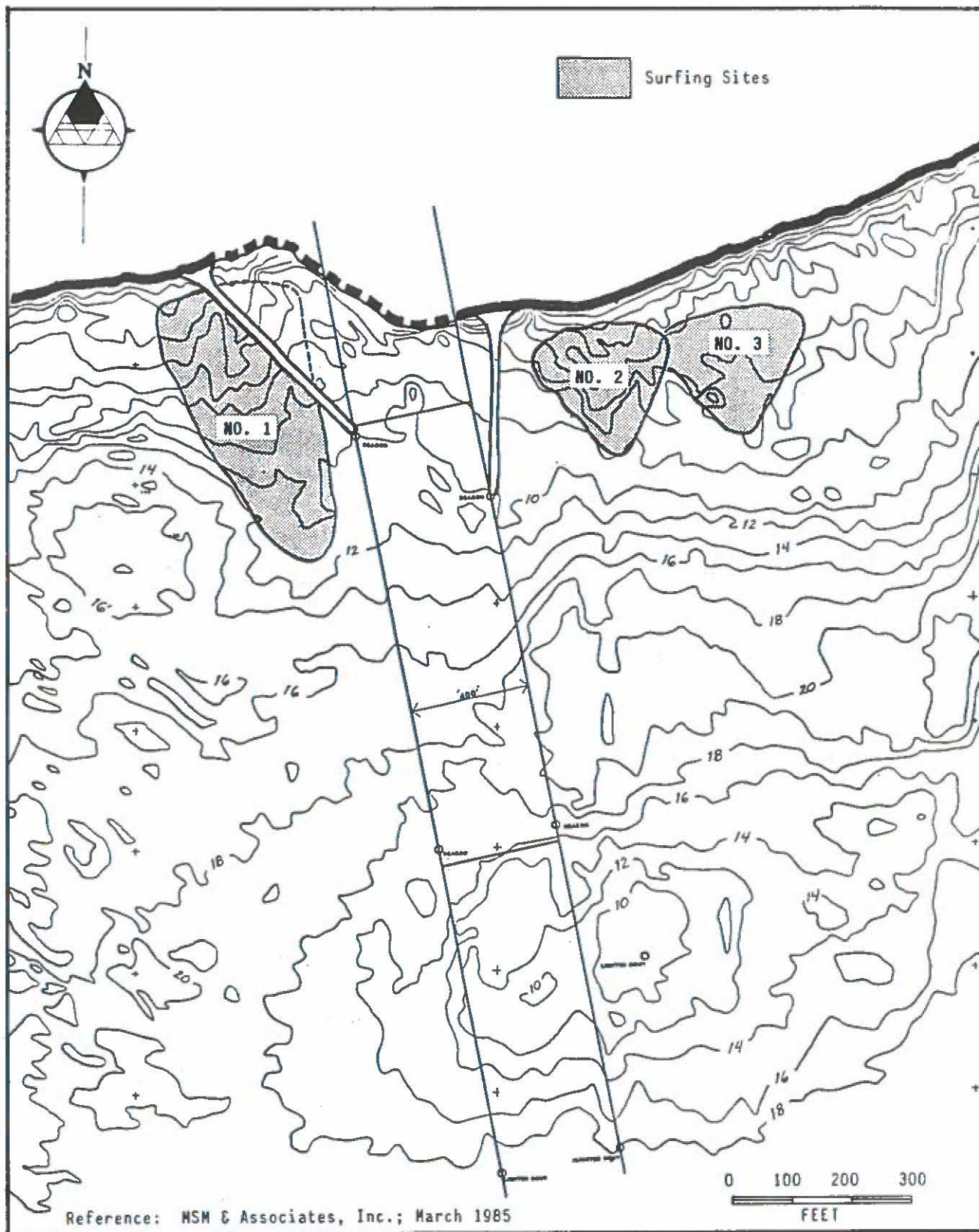
**Sources:**

Unpublished Study, "The Board Surfing Sites Survey", Division of State Parks, Outdoor recreation and historic sites, Dept. Land and Natural Resources.

From copy in Harbors Division, Dept. of Transportation, Original work generated through Dept. Planning and Economic Development 1971 SCORP Studies.

Base Map - U.S.G.S Topographic Map; Ewa, Puuloa, Oahu, Hawaii; 1968.

**SURFING SITES**



Note: Sites are identified using methods explained by Walker, J.R. Recreational Surf Parameters, University of Hawaii, TR 73-30, 1972.

## SURFING SITES

EWA MARINA COMMUNITY



Boat traffic will, furthermore, generate waves which will enter the surfing areas. These boat waves will be dispersed and attenuated by the time they reach the sites and should not significantly impact them. As a point of reference, Kewalo and Ala Moana Bowl intermittently experience a cross-wave that spoils the face of some of the surfing waves during passage of larger, fast travelling boats. These waves, however, are not noticed at sites removed away from the channel. The smaller recreational boats using the Ewa Marina channel entrance should have significantly less impact on surfing than the larger commercial boats using Kewalo. Wave refraction may be changed locally further impacting on Sand Tracks, however this has not been determined to be beneficial or adverse at this time. The refraction in the channel and reflection of waves from the breakwaters will have insignificant impact on the other sites.

The partial destruction of Site No. 1 can be mitigated or compensated by the enhancement of Site No. 2. Furthermore, dredging the entrance channel through the reef could create a bottom configuration capable of transforming waves into desirable surfing forms. The creation of an artificial reef could also be a means of mitigating the partial destruction of Site No. 1. This alternative will be evaluated during final design of the entrance channel.

Seaweed Collection. Limu (primarily Gracilaria spp.) is collected along and off the shore in the area of the proposed Ewa Marina Community. However, the abundance of Gracilaria spp. varies considerably, and the collecting activity is sporadic. Gatherers who supply limu to commercial outlets do not regularly frequent this section of coast, and most of the gatherers are collecting for home consumption. Areas of greatest limu collecting lie to the east fronting the Ewa Beach residential area and the Ewa Beach Park.

Fishing. Development of the shoreline access by road and public rights-of-way and the 1600 slip marina will result in an increase in fishermen. The planned increase in Ewa Plain residents will also substantially increase fishing pressure. However, increased fishing pressure on the already stressed and generally impoverished area would reduce further the value of the area for all fishermen. An expansion of the shoreline as a result of the construction inland of waterways might be beneficial if the channels provided suitable habitat for sought-after species of fish. Potentially, the marina could serve as nursery areas for a number of marine species.

Parks. Ewa Marina Community Increment II will enhance the recreational amenities of the area with the following projects:

- o Park areas to include 15.6-acres of community parks and a 4.7-acre neighborhood park to be dedicated to the city.
- o The existing 30-acre Oneula Beach Recreational Park is within the project site. This park will be improved as part of the project.
- o A 27.5 acre preservation area.

As part of the process, park sites will be dedicated, graded, grassed and provided with all off-site improvements and installation of some type of irrigation system at no cost to the City. Throughout the detailed design

process, the developers will work in close coordination with the Department of Parks and Recreation to determine the location, size and configuration of the parks and public access required by the City.

Although the proposed project will not involve any construction work at Oneula Beach Park, some shoreline recreational activities at this site may be impacted by the project, namely fishing, limu picking, swimming and surfing. Initially, in the dredging for the marina entrance channel, some marine habitats will be altered, thereby limiting the supply of fish and limu. Those who visit Oneula Beach Park to fish and pick limu may find it necessary to temporarily pursue this activity elsewhere. This temporary shortage may be mitigated, however, through the creation of new habitats. In and around the marina, an extended shoreline and new bottom configurations may be conducive to attracting more diverse types of marine life.

It is unlikely that nearshore swimming at Oneula Beach Park will be affected by turbidity or water quality alterations created in channel dredging. Rather than being carried along the shore, these effects will probably be transported offshore.

#### 6.4.9 Electricity/Gas/Telephone Service

Increment II may require a 46 KV substation and two additional 46 KV lines thereto. Should this be necessary, the site for the substation will be leveled and cleared, with road access provided by the developer. The 46 KV lines to the substation can be strung overhead and the primary distribution system installed underground as required by the City & County of Honolulu.

Extension of telephone facilities to cater to new community development is to be provided by Hawaiian Telephone Company, as required.

#### 6.4.10 Health Care Facilities

A total of seven clinics and approximately 60 physicians lie within a 12-mile radius around the project site. Residents of Ewa Marina Community will therefore be within reasonable distance from normal medical care.

Emergency medical services are provided by the City and County Department of Health. The ambulance responding to the Ewa Beach area is located at the Waipahu Fire Station. The Ewa Marina Community can be adequately served by the current system without placing undue stress on the overall level of service. In illustration of this, the Waipahu ambulance currently responds to demands for service at the rate of 2,500 to 3,000 calls per year; whereas the Waikiki-based ambulance manages over 7,000 calls per year.

Twenty-four hour emergency hospital facilities are available at Pearlridge, approximately 7 miles from the project area and at Wahiawa General Hospital, approximately 12 miles.



7.0 THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT  
AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The Ewa Marina Community Increment II would establish a self-contained community with a variety of housing opportunities. Shopping and recreational needs would be provided in a planned development focused on a waterway system offering a diversity of recreational boating facilities. The latter would necessitate localized disturbance of the shoreline with possible temporary localized decline in water quality. This is compensated by enhanced accessibility and availability to the public of a greatly expanded water frontage and a previously less used beach area.

The environment on the project site presently is about 1/2 generally productive sugarcane cultivation and 1/2 generally unused and unproductive (though small areas are productive to a very limited extent in providing private recreation, and small-scale agricultural activities). Surrounding urbanization and the accompanying decline in sugar cultivation may eventually lead to deletion of the cane fields on the subject property even without their urbanization. Further, public policy calls for extensive, continued urbanization in the area as a major component of the area's productivity.

Community development is a permanent commitment of land resources which can be viewed as a productive, long-term use. Current short term uses and unproductive areas would be converted to productive, long term uses through implementation of the proposed project.

7.1 EVALUATION OF THE PROJECT'S CONFORMANCE WITH THE OBJECTIVES  
AND POLICIES OF THE HAWAII STATE PLAN

The proposed development is in conformance with the Hawaii State Plan in Sections 11, 12, 19, and 23, among others.

Those portions of the plan are excerpted as follows:

Sec.-11 Objectives and policies for the physical environment--land-based, shoreline, and marine resources.

(b) to achieve the land-based, shoreline, and marine resources objectives, it shall be the policy of this State to:

(3) Take into account the physical attributes of areas when planning and designing activities and facilities.

(8) Pursue compatible relationships among activities, facilities, and natural resources, especially within shoreline areas.

(9) Promote greater accessibility and prudent use of the shoreline for public recreational, educational, and scientific purposes.

Sec.-12 Objective and policies for the physical environment--scenic, natural beauty, and historic resources.

(b) To achieve the scenic, natural beauty, an historic resources objective, it shall be the policy of this State to:

- (1) Promote the preservation and restoration of significant natural and historic resources.
- (2) Provide incentives to maintain and enhance historic, cultural, and scenic amenities.
- (3) Promote the visual and aesthetic enjoyment of mountains, ocean vistas, scenic landscapes, and other natural features.
- (5) Encourage the design of developments and activities that complement the natural beauty of the islands.

Sec.-19 Objectives and policies for sociocultural advancement--housing

(a) Planning for the State's socio-cultural advancement with regard to housing shall be directed towards achievement of the following objectives:

- (1) Greater opportunities for Hawaii's people to secure reasonably-priced, safe, sanitary, livable homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals.
- (2) The orderly development of residential areas sensitive to community needs and other land uses.

(b) To achieve the housing objectives, it shall be the policy of this State to:

- (1) Effectively accommodate the housing needs of Hawaii's people, especially the elderly, handicapped, displacees of redevelopment areas, and newly formed households.
- (2) Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income, and gap-group households.
- (3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.
- (5) Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.



(7) Foster a variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods that reflect the culture and values of the community.

Sec.-23 Objectives and policies for sociocultural advancement--leisure.

(a) Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.

(b) To achieve the leisure objective, it shall be the policy of this State to:

(2) Provide a wide range of activities and facilities to fulfill the recreation needs of all diverse and special groups.

(3) Enhance the enjoyment of recreational experiences through safety measures, educational opportunities, and improved facility design and maintenance.

(4) Promote the recreational and educational potential of natural resources having scenic, open space, cultural, historical, geological, or biological values.

(5) Ensure opportunities for everyone to use and enjoy Hawaii's recreational resources.

7.2 EVALUATION OF THE PROJECT'S CONFORMANCE WITH THE OBJECTIVES AND POLICIES OF THE COASTAL ZONE MANAGEMENT PROGRAM

The objectives and policies of the Hawaii Coastal Zone Management (CZM) Program are included in the Shoreline Projection Act of 1975 (Chapter 205A, Hawaii Revised Statutes, Part I). The following section evaluates the conformance of the proposed Ewa Marina Community Increment II with the objectives and policies of the CZM program.

§205A-26 Special management area guidelines.

(1) All development in the special management area shall be subject to reasonable terms and conditions set by the authority in order to ensure:

(A) Adequate access, by dedication or other means to publicly owned or used beaches, recreation areas, and natural reserves is provided to the extent consistent with sound conservation principles.

Public access will be provided to and along the shoreline, to all park and recreation areas, through the preserve area, and around the perimeter of the marina.

- (B) Adequate and properly located public recreation areas and wildlife preserves are reserved.

Approximately 20.3 acres of park will be included in the Ewa Marina Community in addition to the 30-acre Oneula Beach Park, the continuous waterfront esplanade, and the public beach. The 20.3 acres of parks will be dedicated to the public and designed in accordance to City and County of Honolulu requirements.

A 27.5 acre preservation area has been designated to maintain the area in its present condition.

- (C) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources.

Sewage generated by the project will be pumped in a force main to the Honouliuli Waste Water Treatment Plant. Pump-out facilities will be provided for boats, and solid waste will be disposed of by the City and County of Honolulu Department of Public Works, Refuse Collection and Disposal Division and/or by private contractors.

- (D) Alterations to existing land forms and vegetation except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities and minimum danger of floods, landslides, erosions, siltation, or failure in the event of earthquake.

As mentioned in previous sections of the EIS, the project has been designed to minimize adverse impact to water resources, scenic and recreational amenities; and to minimize danger due to floods, erosion, and siltation.

- (2) No development shall be approved unless the authority has first found:

- (A) That the development will not have any substantial adverse environmental or ecological effect, except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health, safety, or compelling public interests. Such adverse effects shall include, but not be limited to, the potential cumulative impact of individual developments, each one of which taken in itself might not have a substantial adverse effect, and the elimination of planning options; and
- (B) That the development is consistent with the objectives, policies, and special management area guidelines of this chapter and any guidelines enacted by the legislature.
- (C) That the development is consistent with the county general plan, zoning and subdivision codes and other applicable ordinances.

- (3) The authority shall seek to minimize, where reasonable:



- (A) Dredging, filling or otherwise altering any bay, estuary, salt marsh, river mouth, slough, or lagoon.
- (B) Any development which would reduce the size of any beach or other area usable for public recreation.
- (C) Any development which would reduce or impose restrictions upon public access to tidal and submerged lands, beaches, portions of rivers and streams within the special management areas and the mean high tide line where there is no beach.
- (D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast.
- (E) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

The conformance of the proposed development to sections (2) and (3) is to be determined by the approving government agency or authority.

8.0 ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS  
OF RESOURCES WHICH WOULD BE INVOLVED  
IF THE PROPOSED ACTION SHOULD BE IMPLEMENTED

Implementation of this project would permanently commit money, time, labor, and physical resources. Replacement of presently cultivated fields and rural settings with urban structures establishes a direction that is unlikely to be reversed. Configuring the shoreline to accommodate the marina and excavation to create the marina represent a decision that, once made, must be followed through to completion. The archaeological information undiscovered during construction would be essentially "lost" to future study. One surf site would be eliminated.



## 9.0 PUBLIC INVOLVEMENT

The Notice of Preparation of a Draft EIS for Increment II was published in the OEQC Bulletin on November 8, 1984. The consultation period ended December 8, 1984. The agencies, organizations, and individuals listed in Table 9-1 requested to be a consulted party in processing of the EIS or responded to issues raised in the Notice of Preparation.

Reproductions of the requests, comments, and replies are provided in Appendix C.

The Notice of Preparation was also used as a Notice of Intent to prepare a draft environmental impact statement for Army Corps of Engineers permit action. The Notice of Intent was published in the Federal Register on October 26, 1984. The Army Corps of Engineers is currently preparing their Draft EIS for the Ewa Marina Community.

TABLE 9-1

LIST OF AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RESPONDING  
TO THE NOTICE OF PREPARATION

---

U. S. Army Corps of Engineers  
State of Hawaii  
    Department of Land and Natural Resources  
    Department of Planning and Economic Development  
City and County of Honolulu  
    Department of Public Works  
    Department of Land Utilization  
Environmental Communications  
VTN-Pacific  
Conservation Council for Hawaii  
Life of the Land  
Bertell D. Davis

The Draft EIS for Increment II was available for review from September 20, 1985 to November 7, 1985. The agencies and organizations listed in Table 9-2 commented on the Draft EIS. Reproductions of the comments and responses are provided in Appendix D.

TABLE 9-2

LIST OF AGENCIES AND ORGANIZATIONS COMMENTING ON THE DRAFT EIS

U.S. Army Corps of Engineers  
U.S. Coast Guard  
U.S. Federal Aviation Administration  
U.S. Fish & Wildlife Service  
U.S. Geological Survey  
U.S. Soil Conservation Service  
U.S. Department of the Navy, Barbers Point NAS  
U.S. Department of the Navy, Headquarters

State of Hawaii

Department of Accounting and General Services  
Department of Agriculture  
Department of Defense  
Department of Education  
Department of Health  
Department of Land & Natural Resources  
Department of Planning & Economic Development  
Department of Social Services & Housing  
Department of Transportation  
Office of Environmental Quality Control

City & County of Honolulu

Department of General Planning  
Department of Housing and Community Development  
Department of Land Utilization  
Department of Parks & Recreation  
Department of Public Works  
Department of Transportation Services  
Police Department

University of Hawaii

Environmental Center  
Water Resources Research Center

Board of Water Supply

Hawaiian Electric Company, Inc.



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**APPENDIX A**  
**METRIC CONVERSION TABLE**

# METRIC CONVERSION TABLE

	When you know number of	Multiply by	To find number of
LENGTH	inches	2.54	centimeters
	feet	30	centimeters
	yards	0.9	meters
	miles	1.6	kilometers
AREA	square inches	6.5	square centimeters
	square feet	0.09	square meters
	square yards	0.8	square meters
	square miles	2.6	square kilometers
	acres	0.4	hectares
WEIGHT	ounces	28	grams
	pounds	0.45	kilograms
	short tons (2000 pounds)	0.9	metric tons
VOLUME	teaspoons	5	milliliters
	tablespoons	15	milliliters
	cubic inches	16	milliliters
	fluid ounces	30	milliliters
	cups	0.24	liters
	pints	0.47	liters
	quarts	0.95	liters
	gallons	3.8	liters
	cubic feet	0.03	cubic meters
	cubic yards	0.76	cubic meters
TEMPERATURE	degrees Fahrenheit (°F)	5/9 (after subtracting 32)	degrees Celcius (°C)



**APPENDIX B**  
**MARINA DESIGN CONSIDERATIONS**

EWA MARINA  
EXPANDED EIS INPUT ON TIDAL FLUSHING AND TSUNAMIS

Tidal flushing

Maintenance of good water quality within the marina waterways depends largely on water exchange due to the tides. The mean residence times for water exchange at various points have been calculated using a simple numerical model. In this procedure the marina is visualized as a group of interconnected basins. The individual basins are considered to be well mixed if they have a reasonably compact plan form. Mixing in dead-end channels is assumed to take place by turbulent diffusion. Previous experience suggests that the effective diffusivity of the process is usually greater than 10 sq ft/sec. For purposes of calculation, a conservative value of 6 sq ft/sec has been used.

Figure 1 shows how the waterway system was broken down into component basins, and Figure 2 is a schematic diagram illustrating the water exchange relationships. The channels labeled A, G, and H were assumed to exchange by diffusion. Channels B1, B2, C1, C2, and D are considered to be well mixed because they are nearly aligned with the prevailing trade wind, which will generate circulating currents that flow with the wind near the surface and return upwind next to the bottom. The calculated circulating flow due to a 7-knot longitudinal wind component is about 100 cfs, which will turn over this group of channels in less than two days.

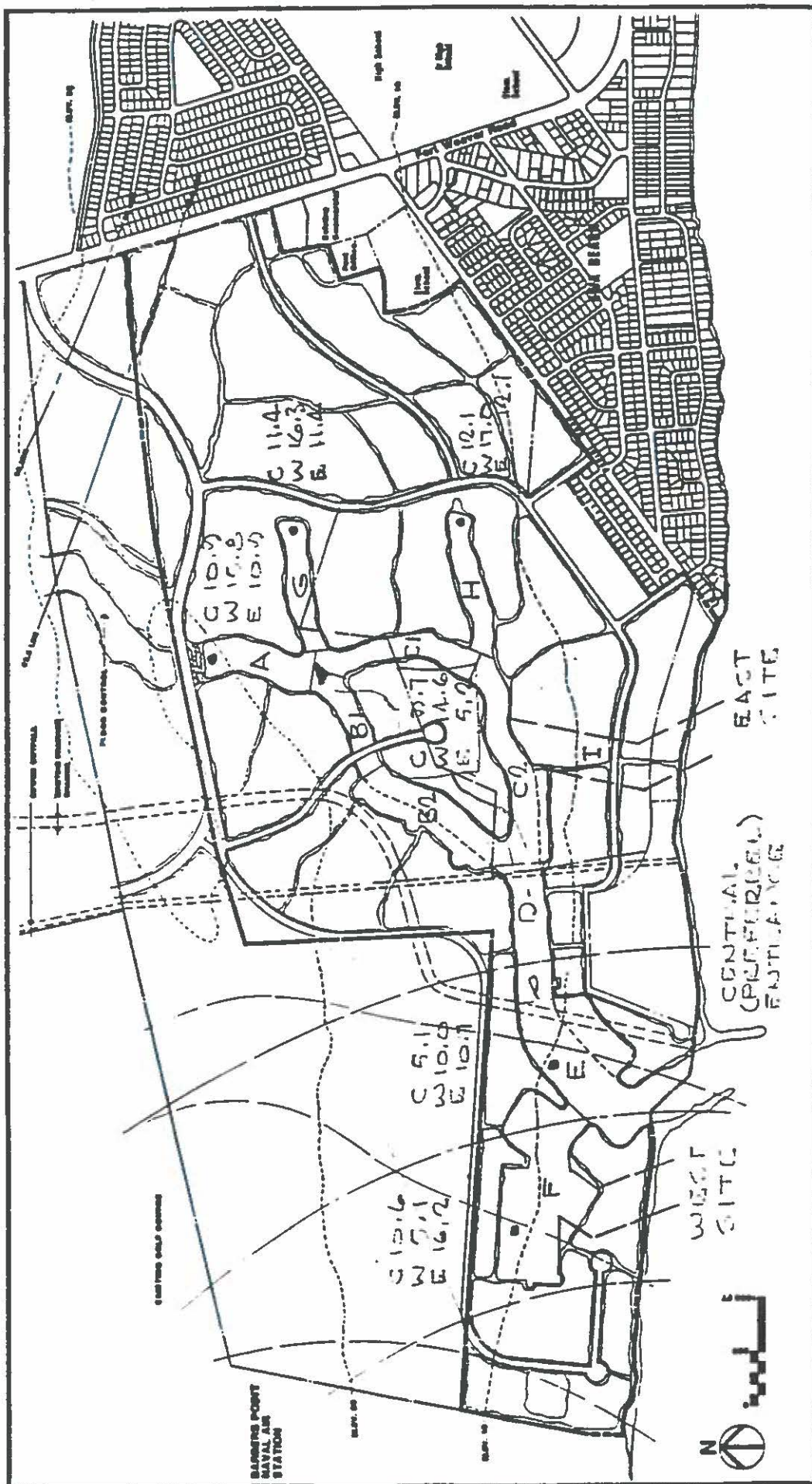
Tidal flows were computed on the basis of one 2-foot tide per day. Exchange flows, computed as the tidal prism volume passing from one basin to another and converted to cubic feet per second, are indicated on Figure 2. Table I contains the dimensional data needed to compute exchange rates and residence times. Computed residence times for the preferred entrance location are the upper numbers shown in Figure 1. The longest is 12.1 days, occurring at the upstream end of Basin H. All of the exchange times are less than the two weeks, usually considered sufficient to assure freedom from water quality problems (in the absence of point pollution sources).

TABLE I

BASIN CHARACTERISTICS - CENTRAL ENTRANCE

<u>Basin</u>	<u>Length (ft)</u>	<u>Width (ft)</u>	<u>Depth ft (MSL)</u>	<u>Volume 1,000 cf</u>	<u>Surface 1,000 sf</u>
A	1,100	300	9	2,970	330
B1	800	200	9	1,567	174
B2	1,800	350	9	5,672	630
C1	1,375	200	9	2,928	325
C2	1,925	300	9	4,850	539
D	1,180	350	11	3,993	363
E			12.4	11,990	967
F			11	12,560	1,142
G	1,340	185	9	2,231	248
H	1,580	180	9	2,560	284





DOUBTING ARE CAPABLE OF PERFORMING THESE DEEDS.

# FLYLINE HOTEL

## COMPARISON OF ENTRANCE SITES

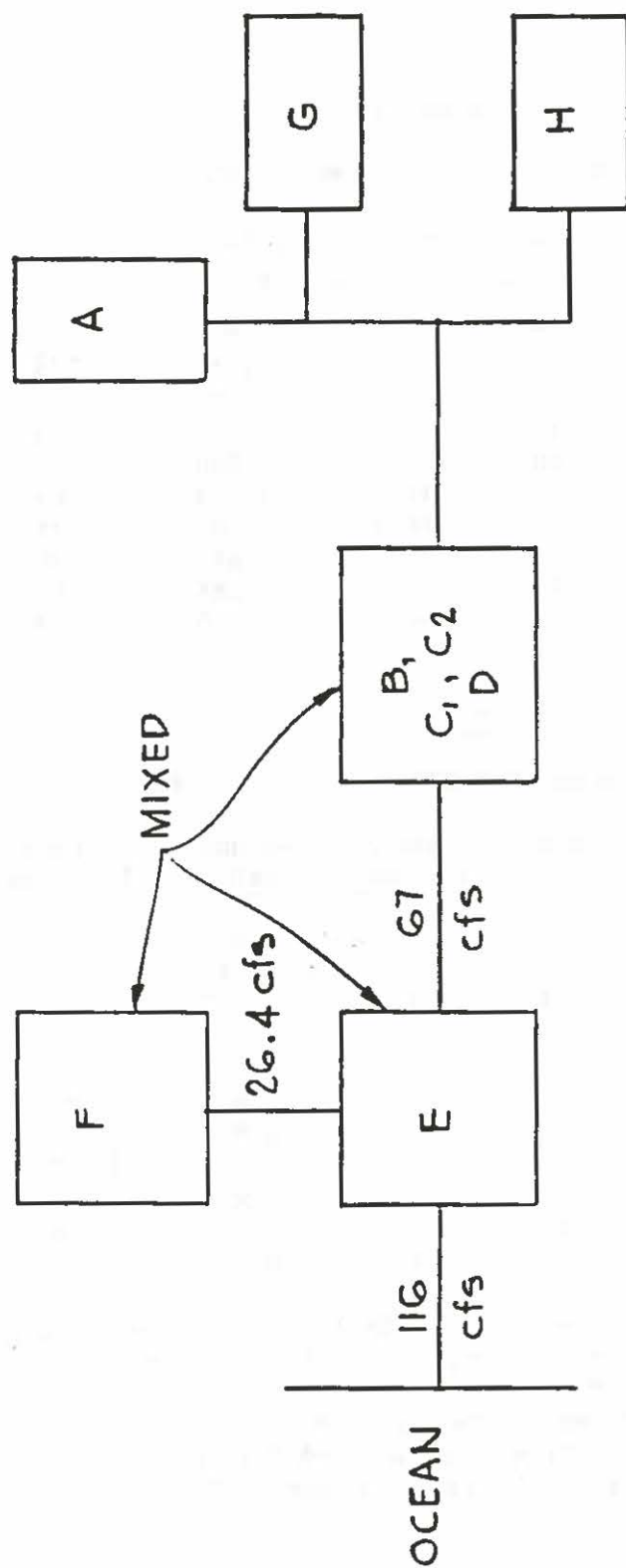


FIGURE 2  
SCHEMATIC DIAGRAM  
DESIGN CONFIGURATION



Similar calculations were carried out for the same configuration of interior waterways, but with the entrance channel moved east or west from the preferred location. Basin dimensions for these alternatives are given in Tables II and III; Figures 3 and 4 are schematic representations of the assumed systems. Computed residence times at various points are shown in Figure 1 (central and lower numbers) for comparison with the selected design. In both alternatives there are some exchange times longer than any that occur in the preferred configuration.

TABLE II

BASIN CHARACTERISTICS - WEST ENTRANCE

<u>Basin</u>	<u>Length (ft)</u>	<u>Width (ft)</u>	<u>Depth ft (MSL)</u>	<u>Volume 1,000 cf</u>	<u>Surface 1,000 sf</u>
A	1,100	300	9	2,970	330
B1	800	200	9	1,567	174
B2	1,800	350	9	5,672	630
C1	1,375	200	9	2,928	325
C2	1,925	300	9	4,850	539
D	1,180	350	11	3,993	363
E			12.4	7,660	634
F			11	16,890	1,475
G	1,340	185	9	2,231	248
H	1,580	180	9	2,560	284

TABLE III

BASIN CHARACTERISTICS - EAST ENTRANCE

<u>Basin</u>	<u>Length (ft)</u>	<u>Width (ft)</u>	<u>Depth ft (MSL)</u>	<u>Volume 1,000 cf</u>	<u>Surface 1,000 sf</u>
A	1,100	300	9	2,970	330
B1	800	200	9	1,567	174
B2	1,800	350	9	5,672	630
C1	1,375	200	9	2,928	325
C2	1,925	300	10	5,390	539
D	1,180	350	11	3,993	363
E			11	6,974	634
F			11	12,560	1,142
G	1,340	185	9	2,231	248
H	1,580	180	9	2,560	284
I	1,600	400	13	8,300	640

A fourth analysis was made of the selected design configuration under the assumption that Channels B through D are not perfectly mixed, but exchange only by turbulent diffusion. This would be the situation during calm weather or if the waterways became strongly density stratified. An effective diffusion coefficient of 10 sq ft/sec was assumed for these channels; they are more subject to tidal action than the finger channels A, G, and H; also they

are wider and more exposed to the wind. Connectivity relationships are shown schematically in Figure 5, and computed residence times in Figure 6. The maximum turnover time increases to 24 days (at the tips of Channels A, G, and H). These values would be considered excessive if they were representative of normal conditions, but calm periods longer than a few days do not often occur.

### Tsunami Effects

The Hawaiian Islands are subject to tsunamis generated around the rim of the Pacific Basin. Fifteen of the 85 tsunamis that have been observed in Hawaii since 1813 have resulted in significant damage. Between 1946 and 1978, four significant tsunamis have been measured in the Ewa Beach area, as follows<sup>1</sup>:

<u>Year</u>	<u>Origin</u>	<u>Runup (ft)</u>
1946	Aleutian Islands	3
1952	Kamchatka Peninsula	5
1957	Aleutian Islands	9
1960	Chile	9

Runup is the elevation of the high water mark left by a tsunami. According to observers' reports, the tsunamis listed above did not produce a bore along the Mamala Bay shoreline, but appeared as a rapid rise and fall of sea level. An urbanized area close to the shore could therefore suffer damage due to inundation, but probably not structural failures caused by impact forces. Flood level maps for the Hawaiian Islands have been prepared by the Corps of Engineers. For most of the coastline, including the Ewa area, the controlling criterion is a tsunami event of 100-year return period. The maximum runup elevation does not exceed +9 feet (MLLW) anywhere on the property, and maintaining the floors of all buildings above +10 should limit the risk of inundation damage to an acceptable level.

Resonance characteristics of the marina waterways may tend to amplify water level fluctuations near the island ends of finger channels. Numerical calculations were carried out on a simplified version of the proposed plan in which the side branches were neglected. Table IV gives the width and depth of the assumed channel section at 500-foot intervals, starting at the shoreline. "Alpha" is the ratio of flow-weighted mean square velocity to the average velocity squared. Manning's "n" was taken as .025. Finite-difference approximations to the one-dimensional equations of motion were solved, using time steps of 1/64 hour.

The forcing function used at the marina entrance was the tide gage record from Honolulu Harbor during the 1960 tsunami, which produced maximum water elevation at that point of 4.1 feet MLLW. The corresponding maximum calculated for the upper end of the marina (at the embankment over Kaloi Gulch) was 7.5 feet. Figure 7 shows water surface elevations at both points. It appears that tsunami surging may be amplified by as much as a factor of two, and should be allowed for when locating structures and designing boat docks. Computed peak flows near the marina entrance were around 45,000 cfs, which translates to a current of 5.5 knots.



FIGURE 3  
WEST ENTRANCE LOCATION

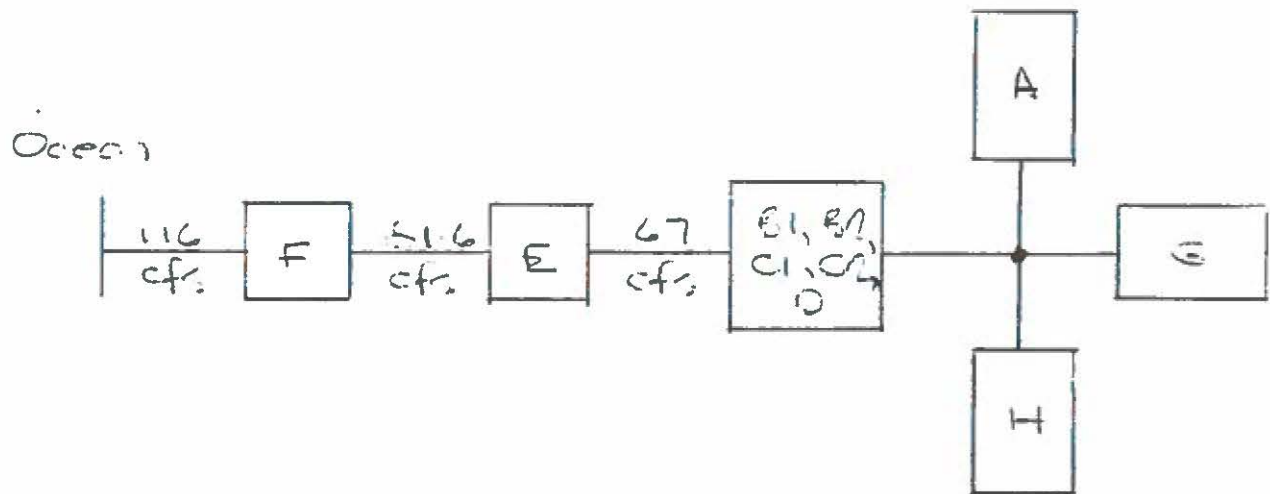
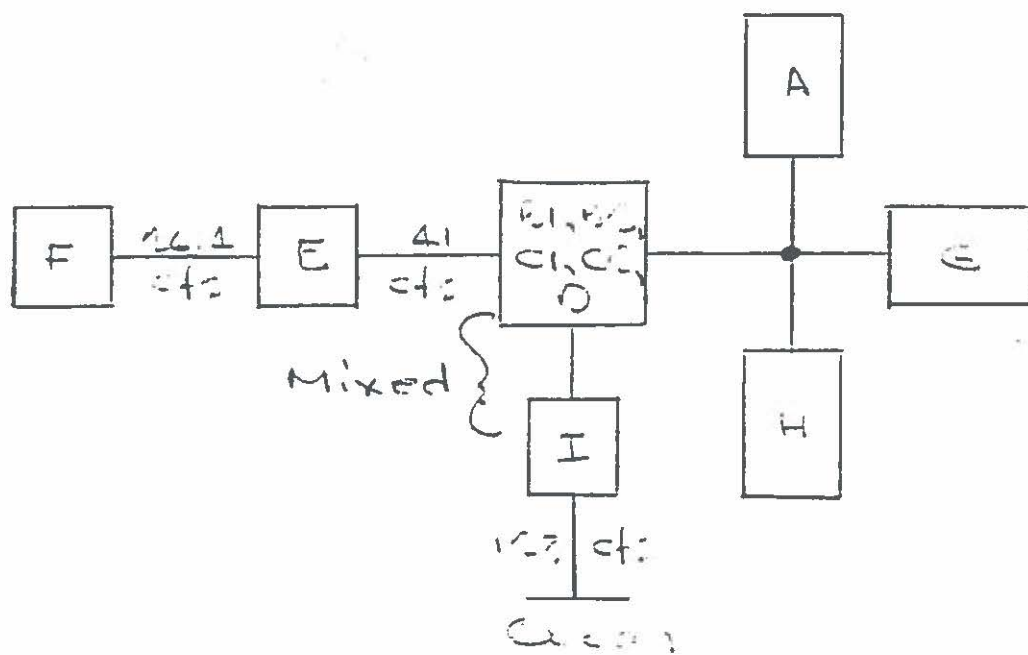


FIGURE 4  
EAST ENTRANCE LOCATION



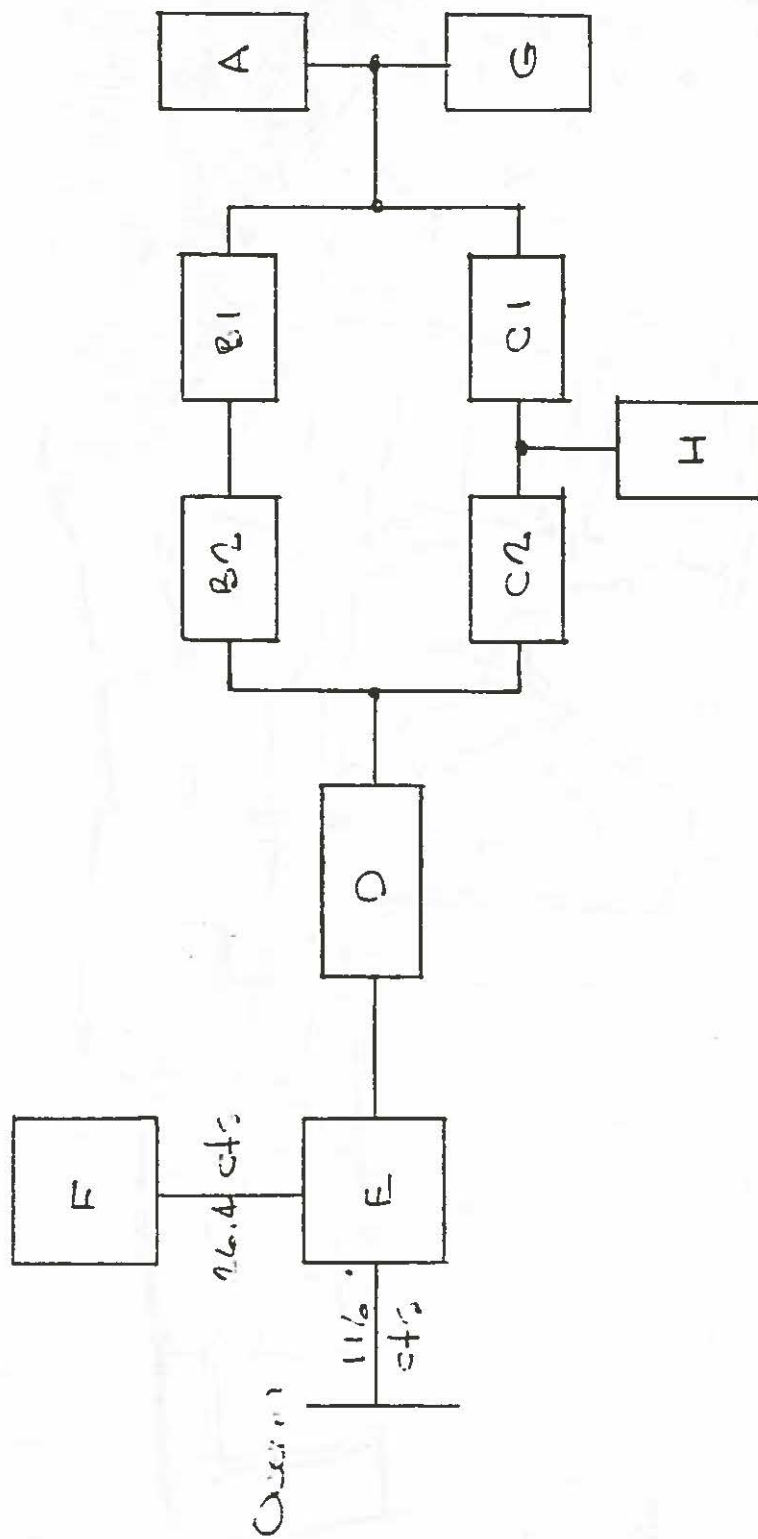


FIGURE 5  
STRATIFIED CONDITION





TABLE IV

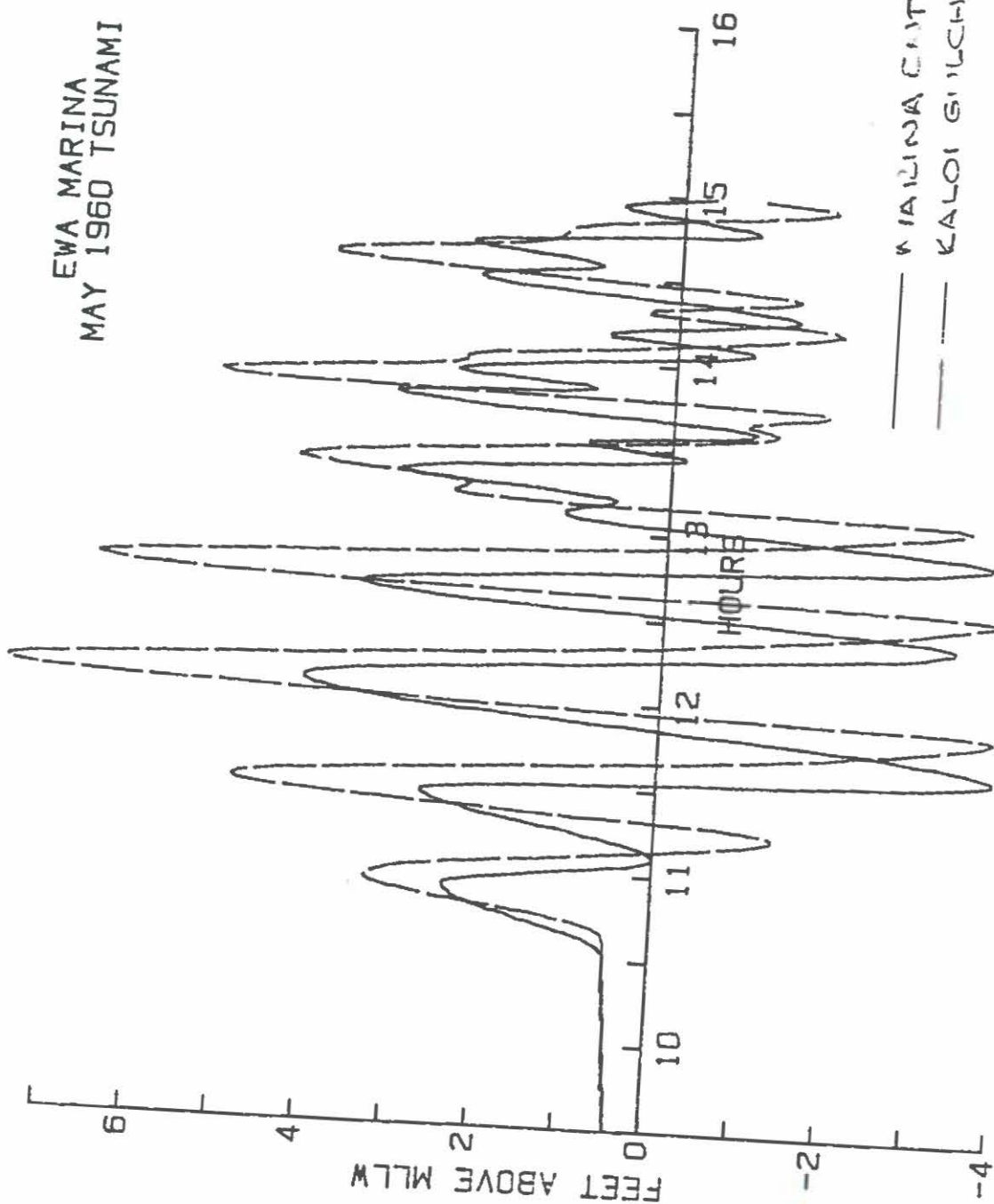
ASSUMED CHANNEL CHARACTERISTICS

<u>Station</u> <u>(ft)</u>	<u>Depth</u> <u>(ft)</u>	<u>Width</u> <u>(ft)</u>	<u>Alpha</u>
0	12	400	1.0
500	12	400	1.0
1,000	12	400	1.0
1,500	12	760	1.2
2,000	12	720	1.2
2,500	12	340	1.0
3,000	10	340	1.0
3,500	9	400	1.0
4,000	8	730	1.0
4,500	8	730	1.0
5,000	8	730	1.0
5,500	8	470	1.0
6,000	8	470	1.0
6,500	8	500	1.0
7,000	8	500	1.0
7,500	8	500	1.0

<sup>1</sup>Pararas-Carayannis, George, "Catalog of Tsunamis in the Hawaiian Islands", U.S. Dept. of Commerce, ESSA-Coast & Geodetic Survey, 1969.



EWA MARINA  
MAY 1960 TSUNAMI



WATER SURFACE ELEVATIONS

## RESIDENCE TIME CALCULATIONS

1. Tidal exchange flux. Residence time calculations were based on an assumed tide of two-foot range, once per day. Actually, there are two tides every 25 hours and the mean range is 1.3 feet. The diurnal range (mean difference between higher high tide and next lower low tide) is 2.0 feet at Honolulu. Two 1.3-ft tides per day provide about the same water exchange as one 2-ft tide. Using the single 2-ft tide is slightly more conservative.

2. Conservative assumptions used in residence time computations.

a. Channels designated A, G, and H were assumed to exchange by slow turbulent diffusion, whereas they are actually aligned roughly 45 degrees with the prevailing trade wind and therefore may often experience longitudinal wind currents that will mix them rapidly.

b. The assumed coefficient of longitudinal turbulent diffusion of 6 sq ft/sec is somewhat lower than most measured values reported in the literature, which are on the order of 10 sq ft/sec.

c. The actual tide exchange at the marina entrance is somewhat greater than assumed (per Paragraph 1 above).

However, there are some unconservative features of the analysis which should also be kept in mind:

d. Channels B, C, D, and E were assumed to be kept well mixed by a longitudinal current generated by a 9-knot trade wind. There could be prolonged calm periods. (Effects of calm on residence times were covered in material sent previously.)

e. The possible introduction of nutrients, especially nitrate, in groundwater seepage could greatly exacerbate the consequences of slow water exchange.

3. Tsunami inundation area inside marina. Rough calculations described in previous material resulted in a maximum runup height of 7.5 ft MLLW at Kaloi overcrossing, when the excitation at the marina entrance was taken as the Honolulu Harbor tide gage record during the May 1960 tsunami. The proposed land elevations inside the marina reach +10 feet at a distance of 50 feet from the bank, and the inundated strip of land would therefore not exceed 30 feet in width.



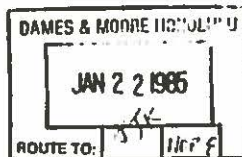
**APPENDIX C**

**AGENCIES, ORGANIZATIONS, AND INDIVIDUALS  
RESPONDING TO THE NOTICE OF PREPARATION**



REPLY TO  
ATTENTION OF  
Operations Branch

DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT SHAFTER HAWAII 96838 -5440  
January 18, 1985



Ms. Jennifer Kleveno  
Dames and Moore  
1144 Tenth Avenue, Suite 200  
Honolulu, Hawaii 96816-2497

Dear Ms. Kleveno:

This concerns your application for Department of Army permit File No. PODCO-0 1570-SD for the proposed Ewa Marina project. We have reviewed the preliminary EIS submittal for your DA permit application, however, the submittal is not adequate to satisfy the requirements for a Federal Environmental Impact Statement.

The major issues affecting adequacy of the submittal for a Federal EIS are:

- a. Omissions of elements necessary to satisfy DA permit EIS requirements.
- b. The need for alternative designs to mitigate loss or to prevent loss of surfing values, i.e., eliminate groins or relocate the marina entrance.
- c. The need for alternative plans to preserve historic sites in the wetland area.
- d. The need to complete historic surveys.
- e. The need for alternatives to prevent littoral drift interruption along the coast, i.e., eliminate the groins.
- f. The need for design elements to control the discharge of storm water into the marina, i.e., silt basins.
- g. The need for alternate marina dredging activities and alignments.
- h. The EIS does not address issues previously raised by reviewing agencies or individuals.

-2-

We are in the process of rewriting some portions of the EIS. Recommend meetings with my Operations Branch to discuss the necessity of studying other alternative plans.

Sincerely,

*Everette A. Flanders*  
Everette A. Flanders  
Chief, Construction-Operations  
Division

Copy Furnished:

MSN and Associates, Incorporated  
33 South King Street, Room 410  
Honolulu, Hawaii 96813

Environmental Quality Commission  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813



**Dames & Moore**

1144 15th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 715-1585  
Cable address: DAMEMORE

February 11, 1985

**Dames & Moore**

Department of the Army - Operations Branch  
February 11, 1985  
Page 2

Department of the Army  
U. S. Army Engineer District - Honolulu  
Ft. Shafter, Hawaii 96858-5440

NOP 8

Attention: Operations Branch

Gentlemen:

Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community, Increment II  
Ewa, Oahu, Hawaii

We received your letter of January 18, 1985. Pursuant to the discussion at our meeting in your office on February 1, 1985, we offer the following responses to your comments.

- a We understand that you will be aiding us in satisfying the DA permit EIS requirements.
- b,e,g Alternative designs for the marina, entrance channel and groins are currently being assessed and will appear in the Draft EIS.
- c,d Plans for preservation of archaeological sites and additional surveys are being coordinated with the State Historic Sites Officer. The plans will be discussed in the Draft EIS.
- f The proposed storm drainage system will be discussed in more detail in the Draft EIS.

h We understand that you will further identify issues previously raised by reviewing agencies and individuals that require additional examination in the Draft EIS.

Yours very truly,

DAMES & MOORE

  
Masanobu R. Fujioka, P.E.  
Associate

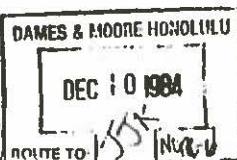
MRP:JJK:ob(1610A/129B:13822-001-11)

cc: MSM & Associates  
Attention: Mr. Roy Cox

GEORGE W. ARITOSHI  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 921  
HONOLULU, HAWAII 96809



SUSUMU OHNO, CHAIRMAN  
BOARD OF LAND & NATURAL RESOURCES  
EDGAR A. HANAU  
DEPUTY TO THE CHAIRMAN  
DIVISIONS:  
AQUACULTURE DEVELOPMENT  
PROGRAM  
AQUATIC RESOURCES  
CONSERVATION AND  
RESOURCES ENFORCEMENT  
CONVEYANCES  
FORESTRY AND WILDLIFE  
LAND MANAGEMENT  
STATE PARKS  
WATER AND LAND DEVELOPMENT

REF. NO.: CPO-1149-85

DEC 7 1984

Ms. Jennifer Kleveno  
Dames and Moore  
1141 Tenth Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

SUBJECT: Comments on the Pre-Draft EIS for the Proposed  
Ewa Marina Community, Increment II at Ewa, Oahu, Hawaii

We have reviewed the subject document and have the following comments:

As we have expressed our concerns on Increment I of the subject project, we want to emphasize those concerns in regard to the management and protection of the groundwater resources within the Pearl Harbor Ground Water Control Area. Since the project is within the Pearl Harbor Ground Water Control Area, the subject EIS should further address the issue of the water supply sources for the project as it is affected by the Pearl Harbor Ground Water Control Area. Appropriate permits and approval from DLNR are required if the plans for the project call for development of ground water within the Pearl harbor Ground Water Control Area.

We also have concerns relating to the proposed jetties and the channel dredging to the sea. We need to know what kind of land rights will be obtained for the jetties and the channel area. Also, who will be responsible for maintenance and liable for public safety of the areas. These concerns should be addressed in the EIS.

Our primary interest from the wildlife standpoint is the wetland area of approximately nine acres, especially if there is a natural fresh water source. As stated in this pre-draft EIS, although the endangered Hawaiian Stilt, Coot and Gallinule are not reported seen in this area, it could be developed and become attractive to waterbirds. A positive step by the developers was to classify the wetland area and additional surrounding area into a 27.50 acre preservation area. Although this pre-draft does not discuss the purpose of the preservation classification, we request that this designation mean no vehicular disturbance except for maintenance purposes and only passive human activities. We anticipate its discussion in the environmental impact statement. It appears that our other concerns - fire protection, emergency services, public access to the beach areas, and other fauna and flora - will also be addressed in the environmental impact statement.

# Board of Land and Natural Resources

CPO- 1149-85

The information regarding archaeological sites in the project area should be considered preliminary. A comprehensive, intensive archaeological survey needs to be conducted in the project area. Federal law requires that all sites in the project area be located and evaluated as early as possible in the planning phase of a proposed undertaking.

The entire project area is part of State Site No. 50-OA-2873, the One'ula Archaeological District. This is not mentioned in the pre-draft EIS. A map showing the amended boundaries of the archaeological site needs to be sent to the National Register of Historic Places, along with photographs (no smaller than 5"x7") of representative visible structural remains. Similar documentation should be sent to the State Historic Preservation Office. A determination of eligibility is required by federal regulations.

A preliminary case report should also be submitted to the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for review and comment, as outlined in 36 CFR 800.

All archaeological work for the project should be coordinated with the staff of the Historic Sites Section in DLNR. Very little coordination or consultation has occurred in the past. Scope-of-work, research designs, field work and reports should be submitted to Historic Sites. Regarding the 1984 reconnaissance survey conducted for this pre-draft EIS, no consultation occurred and no report has been sent to the SHPO.

The plans for site preservation also are inadequate. More sites need to be preserved. Specific recommendations cannot be made by our office until a complete survey is done and we have the opportunity to make a field inspection of the sites in the project area. No site should be destroyed without proper study. The plans for preservation need to take into account the public use potential of the sites.

If construction approval is granted, the EIS should also state that:

in the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls are encountered during construction, the applicant shall stop work and contact the Historic Preservation Office at 548-7460 or 548-6408.



Board of Land and Natural  
Resources

CPO-1149-85

With respect to construction in the marine waters, we suggest that the marina excavation should begin at the inland end and proceed towards the sea; a berm should be left intact as long as possible to separate the area of excavation from the sea. Blasting in waters open to the sea should be limited to intervals between June and October, to minimize potential for impact adverse to Hawaiian humpback whales. Prior to detonations underwater, the blast area should be inspected visually for marine mammals and sea turtles (of which all Hawaiian species are threatened or endangered); detonations must be postponed until these animals have reached distances safe from blast effects.

When dredged spoils from the channel are barged to stockpiles on fast land, the inevitable effects of turbidity would be minimized if spoils are not redeposited in the water (e.g. a crane could transfer spoils directly from the barge onto dry land). If for any reason spoils are dumped back into the water in a basin open to the sea (as is being done at the Barbers Point harbor), silt curtains must be used to reduce the volume of resuspended sediments flushing into the sea.

In addition, although several studies were performed for and cited in the pre-draft EIS, only three surveys partially covered areas over the proposed channel area. The marine biological studies cited in this pre-draft EIS fail to document the marine resource values of the proposed channel area thoroughly and to assess the potential impacts comprehensively. Boat launch facilities, if proposed, and their availability to the non-resident public should also be discussed since mention of boat ramps was made at a scoping meeting on July 19, 1984.

We note on page 5-8 of the pre-draft EIS that "the dredged material would be used for core material in jetty construction and for fill in the residential area." There is no mention of compensation, if any, to the State for this material.

With respect to the Section on "Project and Environmental Assessment Process", we would like to clarify that, although DLW will act as the lead agency in processing the EIS, we will require a revised EIS for the project during the CDUA process, should the Final EIS, accepted by DLW, not adequately address our concerns. Furthermore, there appears to be some inconsistency in the anticipated schedule for processing the CDUA. The submission date is left open yet the

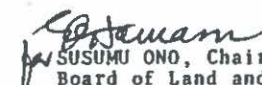
Board of Land and Natural  
Resources

CPO-1149-85

acceptance date is stated as November 7, 1985. Also, we fail to see why the EIS required notification date is listed as December 22, 1985. We suggest that if a proposed schedule for the CDUA process will be made a part of the EIS, the deadlines be consistent with the applicable regulations.

Thank you for allowing us the opportunity to comment. Should you have any questions, please feel free to contact our Planning Office staff at 548-7837.

Very truly yours,

  
SUSUMU ONO, Chairperson  
Board of Land and Natural  
Resources

## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1885  
Cable address: DAMEMOORE

February 11, 1985

State of Hawaii  
DEPARTMENT OF LAND & NATURAL RESOURCES  
P. O. Box 621  
Honolulu, Hawaii 96809

NOP 6

Attention: Mr. Susumo Ono

Dear Mr. Ono:

Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community, Increment II  
Ewa, Oahu, Hawaii

We have received your letter of December 7, 1984, and offer the following responses to your comments.

The Draft EIS will state that the project is within the Pearl Harbor Ground Water Control Area. We understand that DLNR has certified a reduction of about 22 mgd in allocation of water to Oahu Sugar. DLNR could re-allocate this amount to the Board of Water Supply or Campbell Estate for future development. This also will be indicated within the Draft EIS among other water development scenarios.

Based upon our February 5, 1985 meeting with Mr. Mason Young of the Land Management Division of DLNR, we understand that the applicant will have to obtain land rights from the State of Hawaii for the groins and channel areas. The State also will have to be reimbursed for the material removed from the channel area and used by the applicant.

The owner will be responsible for maintenance and the safety of the groins and entrance channel. The EIS has been revised to address these issues.

The preservation classification within the project is intended to maintain this area in its present state. Automobile access will be prohibited. However, public access over existing trails will continue. The wetland is brackish and does not contain a natural fresh water source. The Draft EIS will reflect these clarifications.

## Dames & Moore



State of Hawaii - DLNR  
February 11, 1985  
Page 2

The State Historic Preservation Officer has designated a portion of the project area as the One'ula Archaeological District, State Site No. 50-0A-2873. This statement and a map showing the amended boundaries will be included in the Draft EIS. The Keeper of the National Register has requested additional documentation from the Corps of Engineers to determine eligibility of the designated sites for inclusion in the National Register of Historic Places.

A copy of the 1984 reconnaissance survey conducted for the pre-draft EIS has been sent to the State Archaeologist, Mr. Earl Neller.

We discussed with Mr. Earl Neller on January 21, 1985 his concerns for preservation of archaeological sites and public access to these sites. Plans for site preservation and any additional archaeological surveys required for the project are being coordinated with Mr. Neller and the archaeologist for the project. The Draft EIS will address potential plans for site preservation and will include the following paragraph:

... in the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls are encountered during construction, the applicant will stop work and contact the Historic Preservation Office at 548-7460 or 548-6408.

Concerning construction in marine waters, the Draft EIS will clarify that the entrance to the ocean will not be opened until marina excavation is completed, and that turbidity will be minimized during channel dredging by the transfer of spoils directly onto dry land or by the use of silt curtains. The Draft EIS will also state that if blasting in waters open to the sea should be necessary, the U.S. National Oceanic and Atmospheric Administration, and DLNR will be consulted to minimize the potential for adverse impact to marine mammals. In addition, the blast area will be inspected visually for marine mammals and sea turtles prior to underwater detonations.

The marine biology studies and photographs developed in the field studies for the pre-draft EIS will be forwarded to the Aquatic Resource Section of DLNR to assess the documentation of marine resources. During the soils investigation for the channel, additional photographs will be taken and forwarded to the office. This information will be included in the Draft EIS.

Boat launch facilities will be available to residents and non-residents of the Ewa Marina Community on an equal basis. The Draft EIS will discuss their availability.



State of Hawaii - DLNR  
February 11, 1985  
Page 3

## Dames & Moore


7/4

The CDUA processing schedule that appears in the pre-draft EIS has been revised to indicate the appropriate time periods for agency review of the EIS. In addition, the roles of DLW and DLNR in the permitting process will be clarified in the Draft EIS.

If you have any questions, please contact us.

Yours very truly,

DAMES & MOORE

  
Masanobu R. Fujioka  
Associate

MRF:JJK:ob(1610A/211A:13822-001-11)

cc: MSM & Associates  
Attention: Mr. Roy Cox



# DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT  
KAMAHAMAHU BUILDING, 250 SOUTH KING STREET, HONOLULU, HAWAII 96816  
MAILING ADDRESS: P.O. BOX 2359 HONOLULU, HAWAII 96816

Ref. No. P-752

December 14, 1984

Ms. Jennifer J. Kleveno  
Dames and Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

Subject: EIS Preparation Notice for Ewa Marina Community II,  
Oahu

We request that the Department of Planning and Economic Development be included as a consulted party in the preparation of the subject environmental impact statement (EIS).

The areas that we would like to see addressed in the EIS are as follows:

- relationship of the proposed development to applicable goals, objectives, policies, and Priority Guidelines of the Hawaii State Plan, as well as the appropriate policies and implementing actions of the Functional Plans; and
- relationship of the subject project to relevant objectives and policies of the Hawaii Coastal Zone Management Program.

Thank you for the opportunity to provide these comments.

Very truly yours,

*Kent M. Keith*

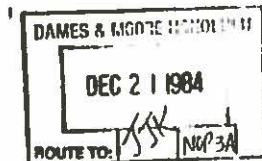
Kent M. Keith

RECEIVED  
DEC 21 1984

KENNEDY/KENNY ENGINEERS  
HONOLULU

GEORGE R. ARYOSH  
COMMISSIONER  
KENT M. KEITH  
DIRECTOR  
MURRAY E. TOWNE  
DEPUTY DIRECTOR  
LINDA KAPUNIAI ROSEHILL  
DEPUTY DIRECTOR

DESIGN  
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION  
ENERGY DIVISION  
1100 Market Street, Suite 400 Honolulu, Hawaii 96813  
NORTH HONOLULU ZONE DIVISION  
1100 Market Street, Suite 400  
LAWRENCE DIVISION  
1100 Market Street, Suite 400  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
OFFICES  
DIRECTOR'S OFFICE  
ADMINISTRATIVE SERVICES DIVISION  
REGISTRATION DIVISION



# DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAHAMAHU BUILDING, 250 SOUTH KING STREET, HONOLULU, HAWAII 96816  
MAILING ADDRESS: P.O. BOX 2359 HONOLULU, HAWAII 96816

Ref. No. P-816

December 31, 1984

Ms. Jennifer Kleveno  
Dames and Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

SUBJECT: Preparation Notice and Pre-Draft EIS  
Ewa Marina Community - Increment II

We offer these additional comments to our December 14, 1984, letter on the Ewa Marina EIS Preparation Notice. Our comments are focused principally on recreational resources with respect to the objectives and policies of the Hawaii Coastal Zone Management Program.

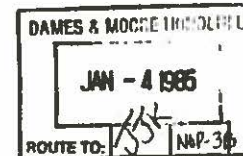
According to the document, an objective of Increment II is to provide boating facilities and a variety of water-oriented recreational activities for Ewa Plain residents (page 2-1). This statement should be supported by more specific and detailed information, insofar as there are anticipated losses of recreational opportunities from the project, such as the loss of a surfing site, the development of 3,600 feet of ocean frontage for residential and commercial use, and the foreclosure of future expansion at Onoula Beach Park.

We have the following questions and comments which we need to discuss in the EIS.

1. Of the 1,000 water slips that will be assigned to Ewa Marina residents and the public (600 of the 1,600 total will be assigned to dwelling units bordering the water ways), how many will be assigned to the public on a permanent basis?
2. Where and how or with what frequency will the public be provided access to and through the esplanades and greenbelts that border the 25,900 lineal feet of the new waterfront created by the proposed project?
3. How will the public gain access to and through the proposed commercial and residential developments along the existing shoreline?

GEORGE R. ARYOSH  
COMMISSIONER  
KENT M. KEITH  
DIRECTOR  
MURRAY E. TOWNE  
DEPUTY DIRECTOR  
LINDA KAPUNIAI ROSEHILL  
DEPUTY DIRECTOR

DESIGN  
BUSINESS AND INDUSTRY DEVELOPMENT DIVISION  
ENERGY DIVISION  
1100 Market Street, Suite 400 Honolulu, Hawaii 96813  
NORTH HONOLULU ZONE DIVISION  
1100 Market Street, Suite 400  
LAWRENCE DIVISION  
1100 Market Street, Suite 400  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
OFFICES  
DIRECTOR'S OFFICE  
ADMINISTRATIVE SERVICES DIVISION  
REGISTRATION DIVISION





Ms. Jennifer Kleveno  
Page 2  
December 31, 1984

4. The document indicates that 3,700 lineal feet of ocean frontage will be dedicated to preservation and park use (page S-3). It should be clarified that approximately 2,500 feet of this amount is presently public land for an existing beach park.
5. Reference is made to 24.5 acres of new park. However, figure S-5 indicates the only additional park in this increment to be P-3 (P-1 being the existing Onoula Beach Park). The location of the new park, therefore, should be specified.

In addition, we understand that the differences between the Navy and Campbell Estate in defining noise level contours through the proposed Increment II have not yet been resolved. There is also the need to discuss shoreline development as it relates to flood zones and floodways of existing shorelines.

We note that similar concerns were identified during the review of the "programmatic EIS," prepared in February 1981 and were of the understanding that these concerns would be discussed in more detail under this incremental approach. However, we find little additional information. We trust that this will be remedied in the preparation of the EIS.

Thank you for the opportunity to comment on this document.

Very truly yours,

*Murray E. Tamm*  
for Kent M. Keith

**Dames & Moore**



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1585  
Cable address: DAMEMORE

November 29, 1984

State of Hawaii  
Department of Planning and Economic Development  
250 South King Street  
Box 2359  
Honolulu, Hawaii 96804

NOP 3

Dear Mr. Kent M. Keith:

Enclosed is a copy of the Ewa Marina Community Notice of Preparation/Pre-Draft EIS. To be a consulted party, we need to receive your comments by December 8, 1984.

If you should have any questions, please do not hesitate to contact us.

Yours very truly,

DADES & MOORE

*Jennifer J. Kleveno*

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob/1kl(1610A/211A:13822-001-11)

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1585  
Cable address: DAMMOORE

February 11, 1985

State of Hawaii  
Department of Planning and Economic Development  
250 South King Street  
Box 2359  
Honolulu, Hawaii 96804

Dear Mr. Kent M. Keith:

Ref. No. P-752  
Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community, Increment II  
Ewa, Oahu, Hawaii

We have received your letters of December 14 and 31, 1984 regarding the EIS Notice of Preparation for Ewa Marina Community Increment II.

The Draft EIS will include a description of the relationship of the proposed development to applicable objectives, policies, and implementing actions of the Hawaii State Plan and the Hawaii CZM Program.

In response to your letter of December 31, 1984, we offer the following comments.

All of the 1,600 boat slips will be available on an equal basis to residents and non-residents of the Ewa Marina Community. None of the slips are assigned to residents.

The greenbelts that border the marina are public thoroughfares as are the roadways within the community. The public will be provided access to these areas on an unlimited basis. An additional figure (diagram) has been included in the draft EIS to illustrate the greenbelt system.

The amount of ocean frontage to be dedicated to the public over the existing park has been indicated in the Draft EIS.

The locations of the new park areas have also been indicated in the Draft EIS.

NOP 3A

**Dames & Moore**

State of Hawaii - DPED  
February 11, 1985  
Page 2

The Draft EIS has clarified the technical differences between the U.S. Navy and Campbell Estate noise level contour methodology and the tsunami inundation zones.

Thank you for commenting. If you have any questions, please contact us.

Yours very truly,

DAMES & MOORE

Masanobu R. Fujioka, P.E.  
Associate

MRP:JJK:ob(1610A/129B:13822-001-11)

cc: MSM & Associates  
Attention: Mr. Roy Cox



*Dec 16 Nov 84* *ML* *AS*

DEPARTMENT OF PUBLIC WORKS  
**CITY AND COUNTY OF HONOLULU**

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813



EILEEN R. ANDERSON  
Mayor

MICHAEL J. CHUN, P.E.  
DIRECTOR AND CHIEF ENGINEER

MAURICE H. KAYA  
Deputy Director

ENV 84-339

November 14, 1984

District Engineer (PODCO-O)  
U. S. Army Corps of Engineers  
Building 230  
Ft. Shafter, Hawaii 96858

Gentlemen:

Re: PODCO-O 1570-SD Dated October 25, 1984

We are responding to the subject public notice regarding Ewa Marina. Our comments are as follows.

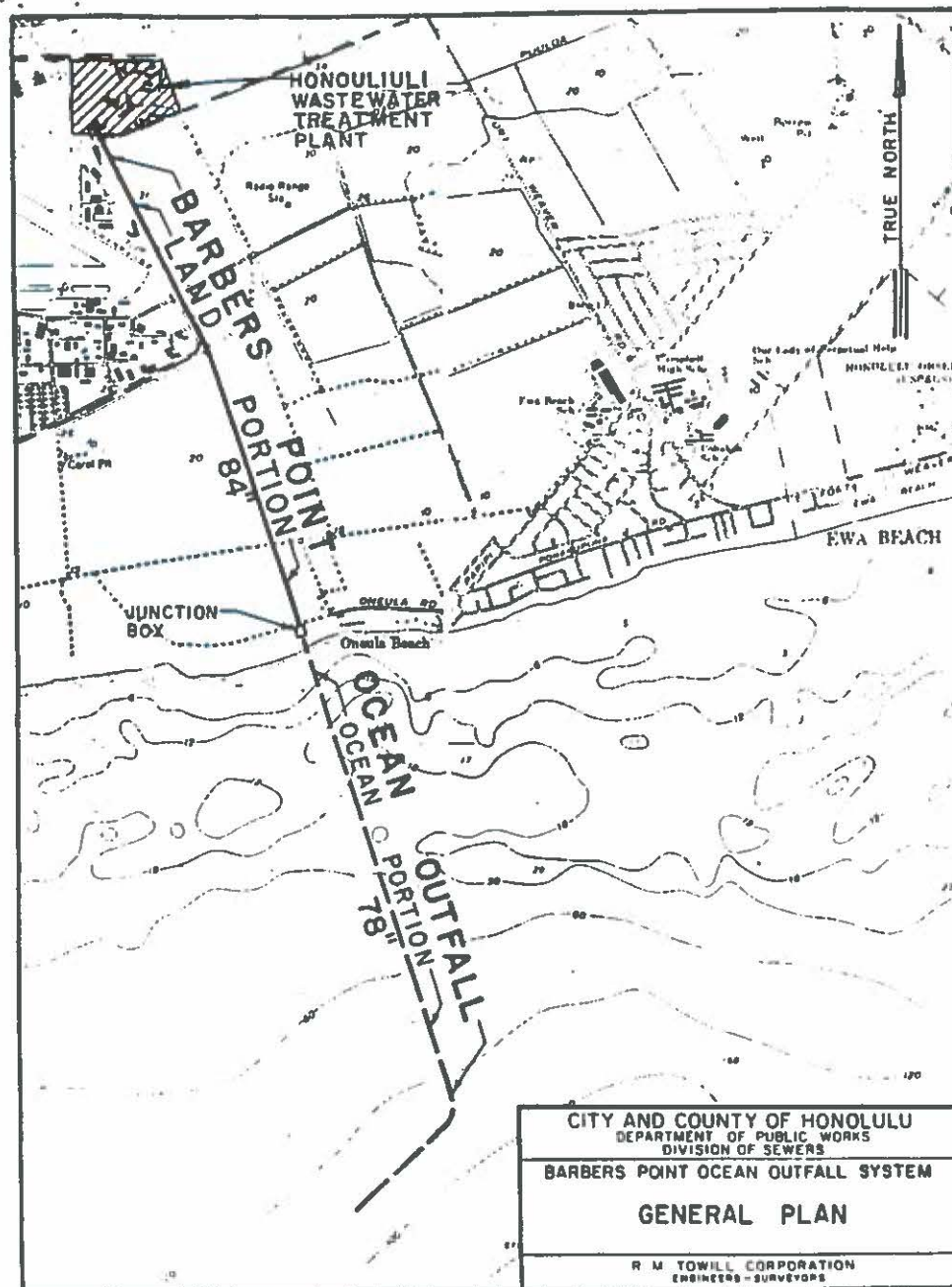
1. The City and County will not be responsible for the maintenance of the proposed marina, entrance channel, internal waterways and sediment retention basin. This responsibility has been assumed by the MSM and Associates, the applicant.
2. Part of the marina will be dredged across the existing Barbers Point outfall. The attached map shows the approximate location of the outfall. During the design phase, the Division of Wastewater Management should be contacted to minimize any disturbance to the outfall.

Me ke aloha pumehana.

*for Michael J. Chun*  
MICHAEL J. CHUN

Director and Chief Engineer

Attach.



1570-SD

# Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1585  
Cable address: DAMMOHRT

November 28, 1984

City & County of Honolulu  
Department of Public Works  
650 South King Street  
Honolulu, Hawaii 96813

COE-1

Attention: Michael Chun

Dear Mr. Chun:

Corps of Engineers  
Permit Application PODCO-01570-SD  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

We have received your letter of November 21, 1984 regarding the permit application for the Ewa Marina Community Increment II.

Pleased be advised that:

1. The applicant, MSM and Associates, assumes the responsibility for maintenance of the proposed marina entrance channel, internal waterways and sediment retention basin. This information is provided in the environmental impact statement prepared for the project.
2. During design and construction of the marina, the City and County of Honolulu, Department of Public Works, Division of Wastewater Management, will be contacted to minimize and mitigate any disturbance to the existing Barbers Point outfall.

Yours very truly,

DAMES & MOORE

S. K. Djou  
Partner

SKD:JJR:ob(1639A/212A:13822-001-11)

cc: MSM & Associates  
U. S. Army Corps of Engineers

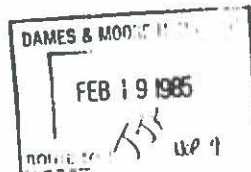


DEPARTMENT OF LAND UTILIZATION  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813-2002



February 15, 1985



STATE OF HAWAII  
JAN 15 1985

(JDN)

Ms. Jennifer Kleveno  
Dames & Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

Environmental Impact Statement (EIS) Preparation Notice (PN)  
For Proposed Ewa Marina Community Increment II, Ewa, Oahu, Hawaii

Our comments on the subject EISPN are provided below:

1. Reference: P. 5-7 & 8, Sect. 5.2.4

Comment: The general location of the on-site disposal area for the marina dredge material should be identified since it could involve the Special Management Area and Shoreline Setback Area.

2. Reference: P. 5-9 and Table 5-1, Sect. 5.2.6

Comment: Information regarding the relative significance of the residence times (i.e., what is optimum, acceptable, non-acceptable) is necessary to evaluate them.

3. Reference: P. 5-9, Sect. 5.2.7

Comment: The EIS should indicate whether public parking will be provided throughout the marina area and near the beach.

4. Reference: P. 5-14 and Figure 5-9, Sect. 5.6.1

Comment: Explain how the existing sewer outfall from the Honouliuli Waste Water Treatment Plant and the proposed sewer mains will cross the marina. The EIS should include information about whether the sewer lines will be installed above or below the marina floor, and also what will be done with the existing Honouliuli outfall during dredging. Measures to monitor the sewer lines for leaks, especially in the marina area, and measures to take care of contamination should be proposed.

Ms. Jennifer Kleveno  
Page 2

5. Reference: P. 6-43, Sect. 6.10.3 and P. 7-12, Section 7.1.5.2

Comment: Existing sound levels and potential noise impacts were evaluated solely on the basis of Ldn values. Ldn does not accurately represent the actual noise situation because it is only an average value. Data on intrusive noise levels and their sources is required. For a given Ldn value relatively constant noise, even at moderate levels, may be more tolerable than quiet levels interspersed with loud intrusions, i.e., aircraft. Therefore, a comprehensive noise profile should be included in the EIS to provide a better "picture" of the actual noise situation.

6. Reference: P. 6-43, Sect. 6.11; Figures 6-8 & 6-9; and Figure 5-3

Comment: Commercial and retail uses are planned within an Accidental Potential Zone II area. Certain commercial and retail uses are identified as "Normally Incompatible" on Figure 6-8. This matter should be addressed in the EIS.

7. Reference: P. 7-27, Sects. 7.4.5 & 7.4.6

Comments: The EIS should address the need for special marina police and fire protection. It should also include proposals to monitor the marina for pollution violations, such as discharging of boat sewage and refuse.

If you have any questions or comments, please contact John Nakagawa or our staff at 523-4648.

Very truly yours,

*John P. Whalen*

JOHN P. WHALEN  
Director of Land Utilization

JPW:s1

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 733-1555  
Cable address: DAMEMOORE

February 27, 1985

Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Attention: Mr. John P. Whalen

Gentlemen:

Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community Increment II  
Ewa, Oahu, Hawaii

We have received your comments of February 15, 1985 on the Environmental Impact Statement (EIS) Preparation Notice (PN) for the proposed Ewa Marina Community Increment II. Responses to your comments are provided below.

1. The material to be dredged to form the marina and entrance channel will be used throughout Increment II for fill material in the residential and commercial areas. Some of the material will be placed on the residential and commercial areas within the Special Management Area and Shoreline Setback Area. The exact quantities will be determined during final grading plan development. This will be reflected in the Draft EIS.
2. The residence time for a parcel of water within the marina is an indication of the duration which plankton are exposed to nutrients and sunlight in the confined marina waters. Under similar conditions, plankton populations are greater with longer residence times. Plankton population and suspended solids would be the dominant factors in water quality of the proposed marina.

The determination of "optimum, acceptable and non-acceptable" residence times is largely a subjective judgement (assuming the residence time is not sufficiently long to create water quality violations or health hazards). Residence times for Hawaii Kai, a similar community, have been reputed to be in the order of 30 days, and water quality within Hawaii Kai historically has been considered "acceptable". An estimated residence on the order of 10 days should be acceptable, and perhaps result in water quality higher than that of Hawaii Kai.

3. Public parking will be allowed on all public streets, in conformance with City and County of Honolulu parking regulations. Parking in the commercial areas will be governed by normal commercial practices.

NOP 9

**Dames & Moore**

Department of Land Utilization  
February 27, 1985  
Page 2

4. The portion of the sewer outfall from the Honouliuli wastewater treatment plant that passes beneath the marina will be replaced with a siphon so that the siphon can be placed beneath the bottom of the marina. The siphon will be designed to City and County of Honolulu Department of Public Works standards and approved by them. The siphon will be constructed at the developer's expense.

The planned sewage collection system for Ewa Marina Community will not cross the marina, but skirt the marina, as indicated by the locations of the seven mains shown on Figure 5-9 of the EISPN. All sewer lines will be constructed to applicable standards to minimize the pollution threat of exfiltration from the collection system and disruptions of the wastewater treatment plant caused by infiltration to the collection system. This will be indicated in the Draft EIS.

5. As indicated in the Preparation Notice, LdN has become the accepted standard to represent the noise environment. The LdN standard was developed, in part, because of the temporal and sound level variability of "intrusive noise" and the variability in measurement and interpretation of intrusive noise information. The accepted standard (HUD, EPA, among others) is LdN for noise measurement, which allows for comparison among communities where LdN values have been calculated.
6. No commercial or retail user determined by U.S. Navy regulations as being "normally incompatible" within an Accident Potential Zone II will be allowed within the APZ for Ewa Marina Community. This will be indicated in the EIS.
7. Police and fire protection for Ewa Marina Community will be provided by the City and County of Honolulu, as indicated in the EIS Preparation Notice. As part of the marina operations, a marina patrol could be formed to provide for security, safety, and environmental protection. The need for protection, beyond that provided by the City and County of Honolulu, will be assessed by the developer during final operations planning as the marina nears completion. This will be reflected in the Draft EIS.

Your comments have been useful in assisting us to disclose and assess the anticipated environmental impacts of the proposed project.

Yours very truly,

DAMES & MOORE



Masanobu R. Fujioka, P.E.  
Associate

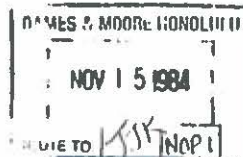
MRF:JJR:ob(1610A/129B:13822-001-11)

cc: MSM & Associates  
Attention: Mr. Roy Cox



ENVIRONMENTAL COMMUNICATIONS, INC.

P. O. BOX 536  
HONOLULU, HAWAII 96809



TO Ms. Jennifer J. Kleveno  
Dames & Moore  
1144 10th Avenue, Suite 200  
Honolulu, HI 96816

DATE November 14, 1984  
SUBJECT Ewa Marina Project

We are by this advice, requesting to be a consulted party in the matter of the Joint NEPA-Chapter 343 Pre-Draft EIS for Ewa Marina. Our concerns are primarily in the shoreline erosion controls, littoral transport of sediment to the West Beach Project, and source development of potable water in the Ewa Plains.

Thank you for your consideration on this matter.

F. J. Rodriguez

Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address DAMEMORE

JJK

November 16, 1984

Mr. F. J. Rodriguez  
Environmental Communications, Inc.  
P. O. Box 536  
Honolulu, Hawaii 96809

NOP 1

Dear Mr. Rodriguez:

Enclosed is a copy of the Ewa Marina Community Notice of Preparation/Pre-Draft EIS. To be a consulted party, we need to receive your comments by December 8, 1984.

If you should have any questions, please do not hesitate to contact us.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(1610A/211:13822-001-11)

**Dames & Moore**



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-5585  
Cable address: DAMES & MOORE

November 28, 1984

VTN-Pacific  
1164 Bishop Street  
Suite 906  
Honolulu, Hawaii 96813

NOP 2

Attention: John Sakaguchi

Dear Mr. Sakaguchi:

Enclosed is a copy of the Ewa Marina Community Notice of Preparation/Pre-Draft EIS. To be a consulted party, we need to receive your comments by December 8, 1984.

If you should have any questions, please do not hesitate to contact us.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

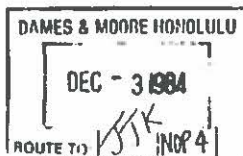
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## CONSERVATION COUNCIL for HAWAII

STATE BOARD AND OAHU CHAPTER • P.O. BOX 2923 • HONOLULU, HI 96802 • (808) 941-4974



November 29, 1984

Ms. Jennifer J. Kleveno  
Dames and Moore  
Aiea Ewa Marina Project  
1144 10th Avenue, Suite 200  
Honolulu, HI 96816

Dear Ms. Kleveno:

The Conservation Council for Hawaii-Oahu Chapter wishes to be a consulted party in the preparation of the Environmental Impact Statement for the Ewa Marina Project.

Please send us a copy of the Joint NEPA-Chapter 343 Pre-draft EIS for our review and comment.

Thank you.

Yours truly,

Rick Scudder,  
Chairman

## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 715-3585  
Cable address: DAME-MORE

December 3, 1984

Mr. Rick Scudder  
Conservation Council for Hawaii  
P. O. Box 2923  
Honolulu, Hawaii 96802

NOP 4

Dear Mr. Scudder:

Enclosed is a copy of the Ewa Marina Community Notice of Preparation/Pre-Draft EIS. To be a consulted party, we need to receive your comments by December 8, 1984.

If you should have any questions, please do not hesitate to contact us.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(1610A/211-13822-001-11)

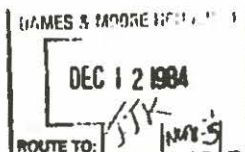
Enclosure



# LIFE OF THE LAND

December 6, 1984

Dames and Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
Attention: Jennifer J. Kleveno



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(HON) 735-3585  
Cable address: DAME-MORE

December 19, 1984

Gentlemen:

According to the November 8, 1984 OEQC Bulletin, which we received a couple weeks ago, a "Joint NEPA-Chapter 343 Pre-Draft EIS for Ewa Marina Community Increment II, Ewa, Oahu" is available. We would appreciate being sent a copy for our review and comment. We also would appreciate being sent a copy of the Draft and Final EIS when they become available.

We would like to be treated as a consulted party for purpose of comment on any EIS concerning the proposed Ewa Marina.

We are a little confused by the OEQC Bulletin Notice. Normally, an EIS Preparation Notice is prepared, then a Draft EIS, and then a Final or Revised EIS. Chapter 343, HRS, and the rules originally adopted by the Environmental Quality Commission do not authorize cutting out one opportunity for public comment by starting out with a Draft EIS. Could you please explain what you are doing procedurally?

We also are confused by the designation of the DLU as the agency with responsibility to approve the EIS. Since you will be using State land for the entrance channel, isn't the OEQC the accepting authority for the EIS?

Our concern with the proposed marina is that it might damage a surf site or a sandy beach, that it might cause beach retreat, and that it might require replacing a sizable stretch of beach with a seawall to protect structures threatened with either natural or artificially caused beach retreat. If a surf site is damaged or destroyed, then we will insist on replacement or compensation as required pursuant to Chapter 205A, HRS. If proposed groins are going to pose a threat of lee side erosion, then we are going to insist that no structure be built so close to the shoreline that a seawall will be eventually needed to protect that structure. Chapter 205A, HRS, also prohibits construction of structures so close to the shoreline that they might be menaced by natural beach retreat. Notwithstanding the existence of the State required shoreline setback of 40 feet, everyone is well aware that some shorelines on Oahu have retreated as much as 100 yards in 30 or 40 years.

Sincerely,

*D. T. Callan*

Dennis Callan

cc: DLU  
cc: Corps of Engineers

Mr. Dennis Callan  
LIFE OF THE LAND  
250 S. Hotel Street, Room 211  
Honolulu, Hawaii 96813

NOP 5

Dear Mr. Callan:

Enclosed is a copy of the Ewa Marina Community Notice of Preparation/Pre-Draft EIS. A description of the procedure to be used in processing the EIS is contained in Section 1. The period to comment on this document was from November 8 to December 8. Your letter will be included in the Draft EIS which we are now preparing. You will be receiving a copy of the Draft EIS.

The Department of Land Utilization (DLU) is acting as the lead agency in processing the EIS which will be used for a County Shoreline Management Area (SMA) application, State Conservation District Use Application (CDUA), and an Army Corps of Engineers permit. If the Final EIS, accepted by DLU, does not adequately address the concerns of the State Department of Land and Natural Resources (DLNR), then a revised EIS will be required during the CDUA process.

The NOP/Pre-Draft EIS addresses the coastal engineering and recreational concerns mentioned in your letter and further explains the EIS processing.

If you have any questions or concerns, please do not hesitate to contact us.

Yours very truly,

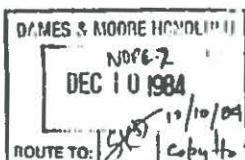
DAMES & MOORE

*Jennifer J. Kleveno*

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:DG:ob(1610A/211A:11822-001-11)





TO: Dames and Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

FROM: Bertell D. Davis, Archaeologist  
Department of Anthropology  
University of Hawaii-Manoa  
Honolulu, Hawaii 96822

RE: JOINT FEDERAL-STATE DOCUMENT, STATE OF HAWAII NOTICE OF PREPARATION,  
U.S. ARMY CORPS OF ENGINEERS PRE-DRAFT EIS: PROPOSED EWA MARINA  
COMMUNITY, EWA, OAHU, HAWAII

First of all, by way of introduction, my name is Bertell David Davis. I am an archaeologist by training and have been directing archaeological research in Hawaii for the past ten years. My principal focus over the last seven years has been the leeward Ewa Plain of Oahu where I have conducted excavations (at Barbers Point) since 1979. This work was under the auspices of the James Campbell Estate, the Bernice P. Bishop Museum, and the University of Hawaii at Manoa. At present I am writing a doctoral thesis on the archaeology of Barbers Point for the University, and for the past four years I have been employed at the Bishop Museum.

Before continuing, I wish to preface my remarks by stating that my comments are provided as a private citizen only, and that in no way do I claim to represent the views of either the Bishop Museum or the University. Moreover, I shall confine this discussion to my area of disciplinary expertise and address the proposed development at Ewa Beach only so far as to resolve issues pertaining to historic preservation. My own thoughts, pro or con, regarding the proposed action are not the issue here, nor are they the motivating reason behind my statements.

I submit this unsolicited commentary on the above document to express my utter dismay, not so much at a preliminary and therefore perhaps incomplete treatment of significant cultural/historical resources at Ewa Beach, but rather with what appears to be for all intents and purposes a substantially finalized treatment that:

- by implication attributes statements and/or conditions regarding the Ewa Beach sites to my archaeological survey report of 1980 which in point of fact are false;
- by apparently deliberate omission of information minimizes the cultural/historical significance of the archaeological features at Ewa Beach; and,
- by continual qualification and repeated emphasis upon "small shelter types", "deposits not deep", "poor condition", and "modern disturbance", further minimizes the importance of the Ewa Beach remains.

A supplemental reconnaissance of the Ewa Beach project area was conducted by Hallett H. Hammatt, a private archaeological consultant, presumably within this past year. Without a copy of Hammatt's reconnaissance report, it is difficult to ascertain just how much of the above originates with the preparators of the pre-draft EIS or with the archaeological consultant. But the fundamental

Dames and Moore  
Ewa Beach Marina  
Pre-Draft EIS  
-2-

pattern is all too familiar in my experience, reminiscent of events surrounding the Barbers Point Deep Draft Harbor area. And if these events are allowed to repeat themselves, I most truly believe that the results will be catastrophic for one of the few relatively intact archaeological site areas left on the Ewa coast. To document the significance of this potential loss for the record, and to make explicit my reasons for concern, I shall proceed point by point in detail.

1. There are no historic period structures or places within the project area that are eligible for inclusion on the National Register of Historic Places (EIS, page 6-34).

This statement is totally unsubstantiated in the pre-draft EIS and, given the similarity of the Ewa Beach project area and the sites therein to the Barbers Point Deep-Draft Harbor Archaeological District, a property declared eligible for inclusion on the National Register (10 June 1977, expanded 28 December 1979), it is also patently misleading. First of all, at the very least, the archaeological features at Ewa Beach are inferred to have once been part of an extensive late prehistoric/early historic coastal Hawaiian settlement. Moreover, analysis of a volcanic glass flake collected from one habitation feature (C-shape 3204-B) yielded a date of 1769±36 A.D. (Davis, page 21). This date ranges from 1733 to 1805, thus spanning the period of initial European contact. And further, at least six other features were recorded with nineteenth century bottle glass scattered over the surface. Yet the pre-draft EIS makes no mention of these facts.

In my survey report of 1980, I made the following recommendations regarding National and State Register eligibility (Davis, pages 26-27).

Based on criteria promulgated by the National Park Service, Chapter 1, Title 36 (CFR) Part 60: sites, structures and districts of state or local importance may be eligible for inclusion on the National Register of Historic Places if they have yielded, or may be likely to yield, information important in prehistory or history. On the basis of these criteria, the following conclusions can be made.

- 1) The entire Survey Zone I, including the swamp and all surrounding archaeological features, is eligible for inclusion on the National and State Registers based solely on the information obtained during the survey.
- 2) The large platform structure (Feature 3209-A) located in Survey Zone II is also eligible for inclusion of the National and State Registers.
- 3) Recommendations regarding eligibility for the remainder of the sites in Survey Zone II, and for the sites in Survey Zone III, are deferred because of insufficient data for reasons stated previously. This is not [emphasis in the original] to be construed as a negative recommendation. Although the relatively unimpressive archaeological features in these zones may, at first glance, appear insignificant, similar structures excavated at Barbers Point have yielded large quantities of midden and volcanic glass thereby providing data of great importance to the prehistory of the region. It is therefore further recommended that the survey of Zones II



and III be completed incorporating a method of detailed surface collection designed to evaluate the potential of features in these zones for yielding significant information before assessing eligibility.

Earl Neller, archaeologist with the State Historic Preservation Office, informs me (personal communication, 1984) that a request for a determination of National Register eligibility was forwarded to the Keeper of the National Register by the U.S. Army Corps of Engineers more than two years ago. The State Historic Preservation Office concurred with this request for a determination which encompassed the entire proposed project area as an archaeological district like that at the Barbers Point Deep-Draft Harbor site. In doing so, the district boundaries included large tracts then and formerly under sugar cane cultivation, my Survey Zone IV in which no surviving cultural remains were found (Davis, page 16). Since no cultural/historical resources were recorded in Survey Zone IV, the request for a determination was returned to the Corps of Engineers instructing that [a] the archaeological district boundaries be amended to exclude the sugar fields, and [b] the Corps of Engineers supply photo documentation of the remaining site areas. To date this has yet to be followed through. Thus there is neither now, nor has there ever been, a formal declaration of National Register eligibility one way or another.

2. The area was previously surveyed by Bertell Davis (Archaeological Survey of the Proposed Ewa Marina Community, Ewa Beach, Oahu, 1979), following a reconnaissance by Jourdan, 1979. Davis mapped and described the archaeological features in detail (EIS, pages 6-34/35).

As the above statement stands it may be all too easily interpreted to mean that [a] the entire project area had been completely surveyed, and [b] all the archaeological sites in the project area had been identified and recorded in detail. This is just simply not true. There were limitations which produced considerable variability in areal coverage and, concomitantly, in the level of detail from one survey zone to another. This is clearly stated several times in my survey report.

The above procedures [beginning with a reconnaissance to locate and initially appraise archaeological features for recording] allowed for at least initial coverage of the entire project area as required. However, the level of completeness, and of confidence in the data collected, gradually diminished as site recording progressed...the level of data recording is not consistent throughout the present survey area. Omissions of potentially significant data are to be expected (Davis, pages 3-4).

The data from Survey Zone II is considerably less secure than is the case for Zone I. From eight quite extensive feature clusters (Sites 3206-3207, 3209-3210, and 3214-3218), only 24 structures were recorded in detail (Davis, pages 18-19).

This [Survey Zone III] is the most disturbed zone in the project area....only nine features were recorded here,...(Davis, pages 19-20).

Recommendations regarding eligibility for the remainder of the sites in Survey Zone II, and for the sites in Survey Zone III, are deferred because of insufficient data for the reasons stated previously....It is

therefore further recommended that the survey of Zones II and III be completed incorporating a method of detailed surface collection designed to evaluate the potential of features in these zones for yielding significant information...(Davis, page 27).

From the above it should be obvious that the archaeological survey of the Ewa Beach Marina project area was not complete in 1980, nor has it been completed as of December 1984. Why then, rather than completing the archaeological survey for the supplemental EIS, was only "a selection of archaeological features... again located and their significance evaluated" (EIS, page 6-35)? And furthermore, why was most of this effort concentrated in my Survey Zone I at the west end of the property when, as stated on page 7-21 of the pre-draft EIS, this has been designated a preserve area? Come now, who is kidding whom, even this minimal effort should have focused upon site areas to be actively developed and for which the data were incomplete. Sufficient data for evaluating the significance of sites in Survey Zone I were already available in my report. The rationale offered for the consultant's selectivity is questionable both in view of the data already at hand and of how that data are used or not used, as the case may be, in the pre-draft EIS.

One explanation offered is that some of the sites could have been destroyed in the five years since my survey (EIS, page 6-35). This certainly is a possibility to be considered. And, indeed, on a field visit this October past I did find evidence of site disturbance. However, this damage of upwards to a quarter of Site Area 3203 was the direct result of bulldozing for drilling equipment to take soil test cores for the proposed development. I found that a whole series of these access roads had been bulldozed at intervals into the forested area. But otherwise the project area was much the same as I had found it five years ago. I do not know if this occurred before or after the supplemental reconnaissance, but I sure would like to know since this destruction of significant archaeological resources is nowhere addressed in the pre-draft EIS.

Another stated reason for the archaeologist's selective duplication of effort is that "it is important to view the significance of these archaeological resources in the context of the research at the Barbers Point Deep Draft Harbor, the bulk of which had taken place in the last four years (Hammatt and Folk, 1981)" (EIS, page 6-35). This may be well and good; but if so, why then is this not done? Nowhere in the ten pages of Section 6.9 of the pre-draft EIS is there any systematic discussion of the significance of the Ewa Beach sites in relation to the documented importance of the Barbers Point area to the study of Hawaiian and Pacific prehistory. And since Hammatt's reconnaissance report has not been made available for review (it has been designated "reserved"), the question remains open. Instead, what we do get in the pre-draft EIS are statements which, by endless qualification, tend to minimize the significance of the Ewa Beach sites (this will be discussed further below).

3. The results of the Davis survey as well as the reconnaissance for Increment II indicate that large tracts of the project area are devoid of archaeological remains (EIS, page 6-35).

This is certainly true for my Survey Zone IV, the area used for sugar cane cultivation, and it may well be true elsewhere. But the above statement as it stands is patently misleading. Again, in comparison to the greater emphasis the pre-draft EIS places upon the sites in Survey Zone I, the implication is that



the other survey zones are less important. In point of fact, this is not the case at all. There are eight quite extensive site complexes in Survey Zone II containing a minimum of twenty-four discrete features, seventeen of which are habitation sites and another being what is the largest dry masonry platform recorded on the Ewa Plain (Davis, pages 18-19, Figure 4, Table 1). Survey Zone III is admittedly more problematic, but I reiterate that this was the section of least effective coverage during the survey. It thus cannot be said categorically that few or no sites of importance are to be found here.

4. The archaeological features found and examined during the 1984 survey are described in Table 6-20 and their locations identified in Figure 6-5. These features are:

3201-C,D,E; 3202-P,C,D,F; 3203-A,B,E,F,G;  
3205-A,B,C,D,F,G,H,I,J,K (listed in table only),N,O,P;  
3206-A,B,C,D; 3209-A; 3210-A,B; and 3215-A,B.

Special effort was made to examine the archaeological features in the area of the Patis swamp (my Survey Zone I) and also the large feature 3209-A west of the chicken farm (EIS, page 6-36).

First of all, if a "special effort was made to examine the archaeological features in the area of the Patis swamp", why then were only twenty-nine out of a total of sixty-two features relocated during that "special effort"? And why then is the entire Site Complex 3204 with its seven structures not listed in the 1984 reconnaissance? Could it be that the missing sites have all been destroyed? I seriously doubt that, since I was able to relocate most of these unaccounted features on my recent field inspection. Perhaps it is because the missing features are small, amorphous, or otherwise easily overlooked by an unfamiliar eye among the limestone rubble and ground-covering vegetation. But again, in as much as the unaccounted features include relatively large cairns (5), C-shaped shelter walls (3), walled habitation enclosures (3), and platforms (5) for which I had identified the confidence level of the data as GOOD, this does not seem a sufficient explanation. This is particularly so in view of the following.

The 1984 reconnaissance was able to relocate Sites 3201-D and E which the pre-draft EIS (Table 6-20) describes as possible surface deposits of unknown extent or depth. My original description provides more usable information, including the fact that these surface deposits contained quantities of shell midden, fish bone, charcoal, and fire-cracked basalt. However, without further surface evidence and information on depth and extent, I was compelled to rate the confidence level of the data here as INCOMPLETE. Approximately 10m to the east of these surface middens the 1984 reconnaissance also relocated Site 3201-C which the pre-draft EIS (Table 6-20) describes as the "third of three adjacent platforms, a small elevated floor of limestone cobbles; structure appears disturbed with extensive rubble around floor." What the pre-draft EIS does not reveal is that I had rated the data confidence level of this site as only FAIR. Nor does the pre-draft EIS say a word about the other two platforms or the associated C-shaped shelter wall which I had rated as GOOD. Consider the following original descriptions.

Site 3201-A (Rectangular Platform); 3.7 x 6m x 15-50cm high:

One of three adjacent platforms; large elevated limestone cobble

floor with possible low perimeter wall extending along north side and c. 2.5m beyond the west edge where the wall stands c. 60cm high and is 75cm wide at the base; shell midden around all three structures including: Turbo, Nerita, Cypraea, Morula and Conus; other surface debris includes some fire-cracked basalt and fragments of recent bottle glass.

Site 3201-B1 (Rectangular Platform); 3.5 x 4.5m x 15-25cm high: Second of three adjacent platforms; a large elevated limestone cobble floor with possible low perimeter wall around four sides; base of platform faced with small limestone boulders and at least some up-right slabs; C-shaped wall abutting south side of platform; surface debris same as listed above.

Site 3201-B2 (C-shape); 2.5m across, walls 50-100cm wide x 15-35cm high: Semi-circular wall abutting southeast corner of Platform B1 and extended around south side with the open side of the enclosed floor on the west; wall built with multiple stacked limestone boulders and cobbles; surface debris same as listed above.

And this raises my second concern about what I believe represents an all too apparent bias, either on the part of the consulting archaeologist or by those responsible for preparing the pre-draft EIS. In part this is a bias as to how much information to make available so that reasoned assessment of the document and prudent recommendations can be made. I think it is quite clear that substantial information, particularly that data most strongly supportive of the significance of the Ewa Beach sites, is not making it through the mill, so to speak. Moreover, out of a minimum grand total of 107 archaeological features at Ewa Beach, only thirty-eight were relocated at all and no new sites were added to the inventory. Considering the I had rated the data confidence level as GOOD for nearly one-half of the original 107 features, I find it quite disturbing that only about one-third of the sites listed in the pre-draft EIS are rated as GOOD. In effect, the pre-draft EIS appears to be weighting the scales with features that, by virtue of their relatively limited data base, may be too easily dismissed as unimportant. What is most disturbing, however, is that this is only one example among many of what I truly believe to be an overt attempt to minimize or side-step completely any effort at or obligation to cultural/historical preservation. Consider the following.

5. All of these sites with the exception of 3209-A consist of small shelter type structural remnants--C-shape structures, low platforms--and miscellaneous small mounds, "ahu" and wall remnants (EIS, pages 6-36,6-42).

This is categorically not true!! Among these so-called "small" features are no less than eight "low" platforms greater than 15m' in area, several being 37-62m', and no less than eleven walled enclosures greater than 15m' in area, including several at 35-60m'. Even the C-shaped structures of more than 15m' account for at least another eleven features. If what I had originally designated as simply being a "structure" (only because the original shape could not be determined without excavation) are taken into account, then there are at least an additional nine features exceeding 15m' in area. These are most certainly not small sites! They are all very well within the size range of documented prehistoric and early historic Hawaiian house sites which have yielded



significant information on Polynesian/Hawaiian settlement and the processes of island cultural evolution. Furthermore, the aspect of size is not germane to the progress of archaeological research or of cultural/historical preservation in Hawaii in the first place. Small does not equate with insignificant. And I consider this continual emphasis upon small or mere or the like, particularly when fully a third of the archaeological sites at Ewa Beach are anything but small, nothing less than a spurious attempt to downgrade the value of these sites. Again:

6. Those [sites] within the vicinity of the Batis swamp [Survey Zone I] are fairly intact and occur in relatively well defined clusters (sites 3202, 3203, and 3205). These are probably late prehistoric Hawaiian features which contain the remains of former occupation scattered around them--shell midden, volcanic glass and artifactual material. Although the deposits of this material are almost certainly not deep, they extend into the limestone rubble and around the margins of the structures (EIS, page 6-42).

It is quite likely that these sites were occupied during the late prehistoric period, after all one date from volcanic glass has already been established between A.D. 1733 and 1805 for one of the sites in the Batis swamp area (Feature 3204-P, which is somehow omitted from the pre-draft EIS). Moreover, in excess of fifty dates from similar features at Barbers Point clearly establish a late prehistoric occupation for the Ewa coast. But nowhere is there any mention in the pre-draft EIS that there was probably a much earlier occupation, at least five centuries earlier and possibly more. This information is available in the Smithsonian Institution study by Olson and James cited in the pre-draft EIS (page 6-36), yet there is no comment. At the other end of the time scale, neither is there any mention of the fact that Sites 3202-A/E/F and Sites 3203-A1/F have late nineteenth century bottle glass scattered on the surface. Granted that this in itself does not confirm a historic occupation of these sites, but this will never be known, nor will anything else at all be known, if these sites are allowed to be destroyed without proper mitigation.

As for the deposits being shallow--so what?!? That is absolutely irrelevant. What is important, however, is that such shallow deposits as these, being at the ground surface, are quite vulnerable to disturbance. Not only can this happen as a direct result of development/construction, but also as a secondary effect since the proposed development will inevitably increase proximity and therefore accessibility to the remaining sites.

Furthermore, these site deposits are not just limited to the "margins of the structures". This has been well established in the Ewa region at least as early as 1978 when Aki Sinoto of the Bishop Museum found site deposits lying well beyond the margins of the structures at Barbers Point. That outwardly rather minimal-appearing C-shapes of only 10m' could be sitting on complex cultural deposits exceeding 100-200m' was further demonstrated by my own work at Barbers Point in 1979. Yet the lesson went unheeded which led in part to a storm of controversy over the 1981 Hammatt and Folk report cited in the pre-draft EIS (page 6-74). The up-shot of that affair brought the Bishop Museum out to Barbers Point to conduct supplemental excavations, including sites reported as having been completely excavated. This of course was not the case in many of these sites, since areas of total excavation amounting to the margins of structures from only 10m' to as much as 30m' were subsequently expanded into

areas of continuous or nearly continuous cultural deposition in excess of 300-500m'. Considering that none of these sites had been adequately dated prior to the Museum work, this could have resulted in a tremendous loss. New dates from this follow-up work now clearly establish the occupation of the near-coastal zone, like the forested area at Ewa Beach, as being well underway by the 1400s and as having significantly expanded post-1600. It is clearly time that this simplistic structure-centered perspective be dispensed with once and for all.

7. The examination of the features of site 3206, situated directly behind the beach in Davis Survey Area II, was less conclusive. These structures are in poor condition and in some cases it is questionable whether they are of ancient origin or are the remains of modern beach activity. This observation probably applies to the other coastal features previously recorded in Survey Area II (EIS, page 6-42).

To begin with, as with the use of "small", I consider the overuse of "poor condition" and similar qualifiers as absolutely unacceptable. So the architecture has deteriorated over time--so what! That is immaterial to what lies below the structure, which more than likely represents considerably more of the occupation of the site. After all, the structure we see today is only the last of what may have been a whole series of structures occupied at different periods in the history of the site's existence. This has certainly proven to be the case at Barbers Point, over and over again. However, a word of caution; this is not to be construed as a license to further damage a deteriorated structure. Anything that happens on the site can potentially, and often does, affect what is in the site.

Regarding the above interpretation of the features in Site Complex 3206, it may be easy to accept if all the information one has at hand is what is made available in the pre-draft EIS. For example, from Table 6-20 of that document we have the following.

Site 3206-A--Rectangular Enclosure:

A disturbed roughly rectangular walled enclosure of multiple-stacked construction with some possible up-right limestone slab facing.

This is the original description from my 1980 survey report (Table 1).

Site 3206-A (Rectangular Enclosure); 4 x 8m with walls 60-120cm wide x 35-65cm high presenting an interior floor area 15m<sup>2</sup>:

A disturbed, roughly rectangular walled enclosure of multiple-stacked construction with some possible up-right limestone slab facing; east wall badly collapsed, but no clear evidence of doorway in other walls; extensive surface scatter of *Cellana*, *Turbo*, *Nerita*, *Cypraea caputserpentis*, *Conus* and *Tellina* shell midden; other surface debris includes recent trash, historic (pre-1900?) bottle glass, and sherds of kerosene lantern glass; historic well with mortared stone wall surrounding a natural sinkhole (with standing water) located c. 50m to the east; confidence level of data FAIR.

That considerably less data for any reviewer of the pre-draft EIS is made available in the document should be quite evident from the foregoing. This is not just an isolated example, either; not a one of the thirty-eight features discussed in the pre-draft EIS are adequately described for the reader to make reasoned judgements.



9. Site 3209 Feature A, situated in Survey Area II..., stands out from all other archaeological features recorded because of its relatively large size (8 meters square). It is probably not a habitation site but more likely a burial. Similar sites have been recorded in the Ewa Plain in the vicinity of the deep draft harbor (EIS, page 6-42).

I agree that this very likely is not a habitation site, but I do not agree that it is more likely to be a burial. This may seem a petty point of difference. However, the distinction is important because of just what this structure could in fact represent in terms of the overall Hawaiian settlement along that part of the Ewa coast.

Of the approximately twenty-five human burials recovered from the limestone areas of the Ewa/Barbers Point region, none were found in above-ground features. They had all been cached in sinkholes. Although two possible burial cairns, complete with vaulted interior chambers, have been recorded at Barbers Point, they had been vandalized at a much earlier time and thus contained no direct evidence that they had been used as burial sites. Other large cairn inferred to be possible burial features were excavated at Barbers Point. These, too, proved not to contain human remains. From the sheer size of this platform with its apparently differentiated levels, it seems clear that this is a functionally specialized structure, most probably ritually oriented. To take this inference so far as to conclude a greater likelihood of its being a burial structure is premature, particularly given our present understanding of traditional Hawaiian burial practices. If the platform dates to the pre-Christian period, then it seems less likely to have functioned as a burial site in view of its very obvious presence and the traditional concern about desecration of the dead. Of course, the possibility that it could be an early Christian-period burial site cannot be dismissed. Put again, considering its size and construction, this too is wanting. One alternative I had not seriously considered before, and for which circumstantial evidence is increasing, is that this structure could be a small heiau--perhaps dedicated to horticultural and related activities.

Whatever the function of this site, the point is that it needs to be substantiated through further research. And this leads me to raise yet another objection to the rather glib treatment of the Ewa Beach sites in the pre-draft EIS. Again the amount of descriptive information available in the pre-draft EIS is typically insufficient to appreciate the fact that this structure is truly unique in the region. It is currently the largest single-unit Hawaiian structure known to still survive out on the Ewa Plain. The above assertion that similar sites have been recorded in the vicinity of the deep-draft harbor is therefore just not true. With few exceptions, such as the three features reported by Emory in 1933 and one recorded by Lewis in 1969, all of which were destroyed before they could be systematically investigated, I have personally seen virtually every substantial structure at West Beach and the deep-draft harbor area, not to mention those recorded at Ewa Beach. And I can testify that on the basis of size they all pale in comparison to this platform.

SUMMATION. In the foregoing I have listed and discussed in detail nine specific points. There are, however, others that are equally unsatisfying. For instance, assertions that the potential for recovering extinct and/or other significant avifaunal remains are unsubstantiated. Just how much of the area around the Batis swamp

is to be preserved and how this is to be accomplished is unstated. Why sites 3201, 3202, and 3205 have been specifically identified for preservation in the pre-draft EIS (page 7-21) while Sites 3203 and 3204, which are contiguous, have been omitted is unexplained. And just what is to be done to mitigate the loss of significant information that will result with the destruction of the remaining sites is unaddressed.

In sum, I find the existing document and its treatment of the archaeological resources in the Ewa Beach Marina project area totally unacceptable. It is true that this is suppose to be a pre-draft document. But as I have already indicated in my opening remarks, the sections on cultural/historic resources have all the appearance of being substantially finalized. This is because in order to address the concerns I have raise, it would be necessary to totally rewrite the entire presentation of Sections 6.9 and 7.3.4. Without such serious reconsideration, the net result could only amount to a parody of cultural/historical preservation and of the whole EIS process.

*Bertell D. Davis*  
Bertell D. Davis  
Archaeologist  
7 December 1984

cc: U.S. Army Corps of Engineers, Pacific  
Department of Land Utilization  
State Historic Preservation Office  
Society for Hawaiian Archaeology  
Environmental Center, UHM  
National Park Service  
Interagency Archaeological Services

**Dames & Moore**

1124 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 733-1585  
Cable address: DAMEMOORE

February 11, 1985

Mr. Bertell D. Davis  
Archaeologist  
Department of Anthropology  
University of Hawaii-Manoa  
Honolulu, Hawaii 96822

NOP 7

Dear Mr. Davis:

Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community, Increment II  
Ewa, Oahu, Hawaii

We have received your letter of December 7, 1984, and appreciate your comments on the pre-draft Environmental Impact Statement (EIS) for the proposed Ewa Marina Community.

The document on which you commented is still in the first draft stages and will be further expanded in response to public concerns. Through public scrutiny the EIS can be improved to address the major concerns of the project.

The statement in the EIS that "there are no historic period structures or places within the project area that are eligible for inclusion in the National Register of Historic Places" is referring specifically to historic period structures or places and not to archaeological remains. However, we are aware that the area has been included in a site complex called the One'ula Archaeological District and this shall be addressed in the Draft EIS.

A major concern will be to improve graphic information on site locations. Although it may not be possible to include all the technical information on each site in the Draft EIS, it will be revised to emphasize the variability in size and shape of the archaeological features.

The observation that the cultural deposits are shallow is based on the nature of the terrain and the fact that fine textured sediments (which contain the cultural deposits) occur in limited areas above the limestone. The horizontal distribution of the cultural material beyond the structures is unknown, and will be assessed during construction.

**Dames & Moore**

Mr. Bertell D. Davis  
February 11, 1985  
Page 2

The DEIS has been reviewed by the project archaeologist and edited to eliminate any bias by the EIS Consultant. A copy of the original full survey was also provided to the State Archaeologist, and consultation is continuing with him to address his archaeological concerns.

As you are aware, there have been a number of archaeological reports prepared for the development area. Yours is the most comprehensive and we feel that you have the greatest familiarity with the archaeological resources of the area. On page 21 of your 1979 survey report, you suggest an alternative to "amend the development plans to include selected archaeological sites into the proposed development as 'preserves' with or without stabilization." For this reason, we are interested in your input into developing a plan for the preservation of some of the more significant cultural resources.

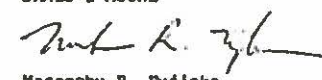
The developer of the property has shown interest in preserving a number of sites and we would like your recommendations for which specific sites and features should be preserved for future interpretive work and public access.

In addition, you have pointed out that there are some gaps in the data collection and that some sections of the reconnaissance area were not thoroughly surveyed because of time constraints. Since we are interested in correcting these deficiencies and providing more complete data on the archaeological resources of the area, we would greatly appreciate your indication of which areas you believe were insufficiently covered.

To this end, we are planning a site visit on the 28th of February, meeting at 9 A.M. at the Beach Park at the makai side of the development area. We cordially invite you to attend. In the meantime, we look forward to hearing from you.

Yours very truly,

DAMES & MOORE

  
Masanobu R. Fujioke  
Associate

MRF:JJK:ob(1610A/211A:13822-001-11)

cc: MSM & Associates  
Attention: Mr. Roy Cox



**APPENDIX D**

**AGENCIES AND ORGANIZATIONS  
COMMENTING ON THE DRAFT EIS**

1/10 12 NOV 85 JK

D28

-2-

November 7, 1985

Galloway  
1k/2264

Maragos  
PODED-PV

Pelowski  
PODED-P

Paresa  
PODCO-O

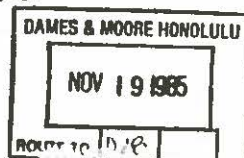
Fujii  
PODED-Z

Cheung  
PODED

M & R

PODED-P  
- file

✓cc: w/Encl  
PODCO-O



Mr. John P. Whalen, Director  
Department of Land Utilization  
City & County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

We have reviewed the Draft Environmental Impact Statement (DEIS) for Increment II of the Proposed Ewa Marina Community, Ewa, Oahu, Hawaii and the Re-zoning Application for Increment II, Ewa Marina Community. The following comments are offered:

The Corps is processing an application for a DA permit required for dredging the marina and entrance channel and for constructing two jetties. Together with the applicant, the Corps is preparing a Federal DEIS to assess the above activities.

According to the Flood Insurance Study for the City & County of Honolulu, prepared by the Federal Insurance Administration, a portion of the project site is within the tsunami inundation limit, with Zone A4 designation (Encl 1). The base flood elevation in this area ranges from 6 to 8 feet above Mean Sea Level. The inland portion of the project site is designated Zone D, area of undetermined, but possible flood hazards. An explanation of zone designations is provided in Encl 2.

Figure 5-4 of the DEIS delineates the limit of the 100-year tsunami, but does not give all of the information provided in the Flood Insurance Rate Map. A map including all zone designations and base flood elevations would probably be most helpful, as it would give the extent of flood hazards in one complete picture.

The following comments are offered on the DEIS.

a. It would be very helpful to include a map of existing vegetation communities. The plant community identified in Section 5.7.1 as a Banks "swamp" would be more properly described as a "wetland" or "marsh," since

woody vegetation is not dominant. The surrounding Pluchea "scrub" should be included within the wetland boundary, since this plant is characteristic of wetland transition zones in Hawaii.

b. The list in Section 5.7.2 of seven native plant species previously recorded by Char but "not in the present survey" includes four species which are subsequently described as "collected during the present survey and the earlier one." The additional statement that "of the endemic species, only one, Hyoporum, was found during the present survey" adds further contradictory information. These statements would be clarified in the FEIS.

c. Section 5.9 of the FEIS should note the possible presence of threatened or endangered marine mammals and sea turtles offshore.

d. Predicted noise levels estimated and mapped in the U.S. Navy and Campbell Estate analyses (Section 5.10.3) are only marginally acceptable compared with community exposure guidelines set by the EPA, State of Hawaii, and City and County of Honolulu (Section 5.10.1). These two predictive studies did not include sources of noise other than aircraft in their computations (the Campbell Estate study even excluded HIA aircraft), thereby underestimating expected total existing noise levels. No direct measurements of existing noise levels have apparently been made to check the predicted values, which are subject to error. Also, Barbers Point HAS operations are conducted on a 24-hour basis, and no analysis of the daily pattern of noise has been made.

e. A large number of WWII-era features have been identified during previous archaeological surveys; there should be some compilation in Section 5.9.2 of what has been found and why it is not considered important.

f. Although the mauka portion of the project area may have no surface archaeological potential, it may have subsurface archaeological potential.

g. The statements on page 5-19 implying that various activities have destroyed or altered various archaeological remains, and that large tracts of the project area are devoid of archaeological remains, are



misleading because they ignore subsurface resources. If features have been destroyed, they should be listed as such.

h. Sinkholes are not absent in the project area as implied on page 5-19 and 5-12; they are not as dense as at Barbers Point but generally contain more sediment. Sampling of sinkholes should be done to assess potential for archaeological and paleontological deposits.

i. Examination of the archaeological features found (page 5-19) should include subsurface sampling. Standard Hawaiian archaeology terminology should be used in Table 5-18 to give an accurate picture of what was found; measurement data and composition of construction material need to be described.

j. The conclusion on page 6-12 that similar sites have been recorded in the Ewa Plain in the vicinity of the deep draft harbor is drawn without explaining what the similarities are.

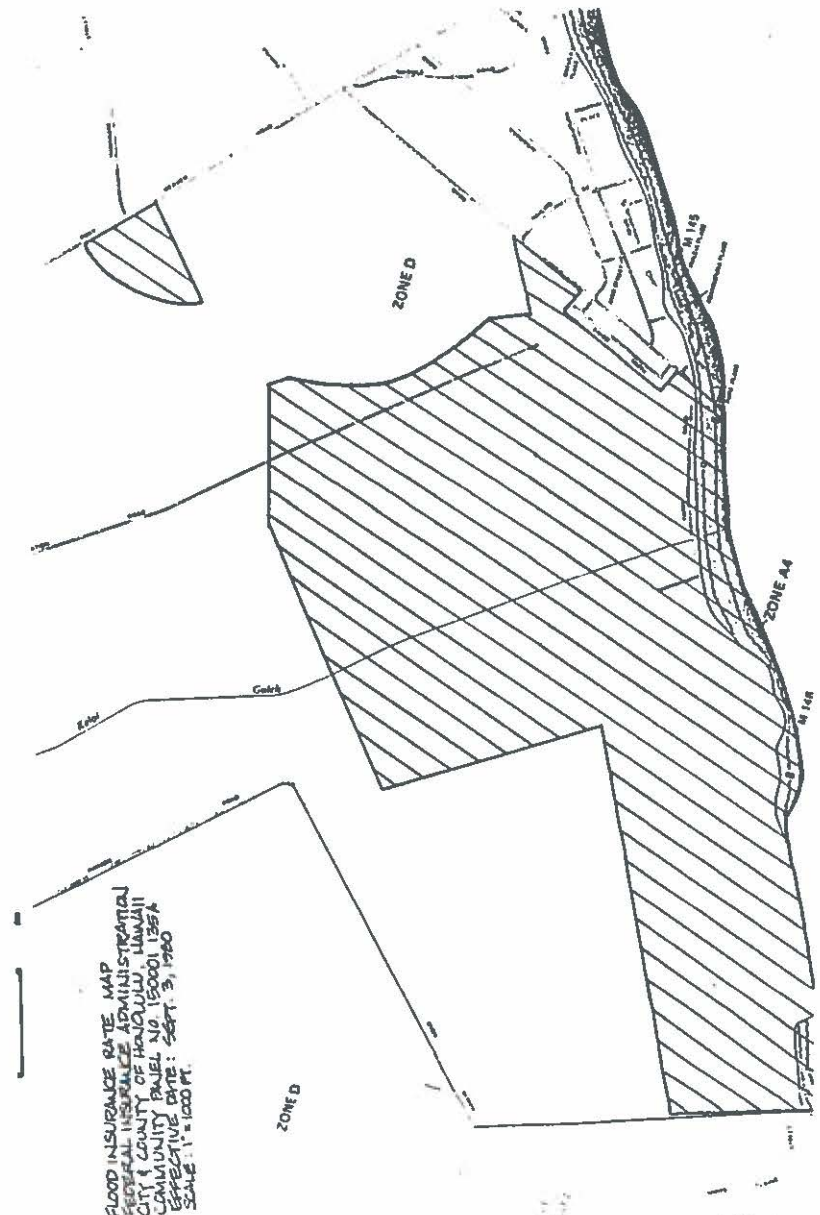
k. A master Data Recovery Plan (DRP) and/or Historic Preservation Management Plan (HPMP) may be appropriate for the sites on this property.

l. Although the discussion of cultural resources in the DEIS is slightly better than that contained in the Draft Preliminary EIS, it is still incomplete and not comprehensive. In particular, after only cursory investigation of some of the sites and the lack of survey in large portions of the property, the sites listed in Table 5-18 are the only ones discussed. The majority have been dismissed as unimportant with no explanation, detailed mapping, or subsurface testing. All these activities should be performed by a qualified archaeologist (not by untrained construction contractors as suggested on page 6-12) before final disposition is determined.

Sincerely,

Kisuk Cheung  
Chief, Engineering Division

Enclosures



ENCL 1

# Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1581  
Cable address: DAMEMORE

December 4, 1985

U. S. Army Corps of Engineers  
Engineering Division  
Pacific Ocean  
Building 230  
Port Shafter, Hawaii 96858-5440

D28

Attention: Mr. Kieuk Cheung  
Chief

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Cheung:

Thank you for reviewing the Draft EIS. We have received your letter of November 7, 1985 and offer the following response to your comments.

Figure 5-4 has been adjusted to include all zone designations.

- A map of existing vegetation communities has been included in the Final EIS.
- The contradictory statements regarding various plant species have been clarified in the Final EIS.
- A list of threatened or endangered marine species has been included in the Final EIS.
- Reference has been made to the following quotation from the EPA protective noise level document dated November 1978, page 24, "perhaps the fundamental misuse of the levels document is treatment of the identified levels as regulatory goals. They are not regulatory goals. They are levels defined by a negotiated, scientific consensus. These levels were developed without concern for economic and technological feasibility, are intentionally conservative to protect the most sensitive portion of the American population and include an additional margin of safety."

## FLOOD INSURANCE RATE MAP (FIRM) FEDERAL INSURANCE ADMINISTRATION

### KEY TO MAP

500 Year Flood Boundary	---
100 Year Flood Boundary	---
Zone Designations* With Date of Identification e.g., 12/2/74	
100 Year Flood Boundary	---
500 Year Flood Boundary	---
Base Flood Elevation Line With Elevation in Feet**	51.3
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7 X
River Mile	0 MI 5

\*\*Referenced to the National Geodetic Vertical Datum of 1929

### NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

### \*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AD	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, average depths of inundation are shown, but no flood hazard factors are determined.
AD	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet, base flood elevations are shown, but no flood hazard factors are determined.
A1 A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood, or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 500-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1 V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

ENCL 2



**Dames & Moore**



Since the protective levels were derived without concern for technical or economic feasibility and contain a margin of safety to ensure their protective value, they must not be viewed as standards, criteria, regulation or goals. Rather, they should be viewed as levels below which there is no reason to suspect that the general population will be at risk from any of the identified affects of noise."

The State of Hawaii Department of Transportation Airports Division, Honolulu International Airport and Environs Master Plan Study, dated June 1981, Appendix P, Draft Ordinances, Table F-1, Land Use Compatibility Standards in Aircraft Noise Exposure Area, indicates that residential construction between Ldn 60 and 65 "shall be compatible only with the installation of the accoustical treatment as described in Section 7". Section 7 states "however, in the Honolulu climate where existing structures have single wall construction with minimal insulation, the Ldn 60 to 65 area may not be compatible without additional noise level reduction incorporated into the design and construction. It should be noted that in many urban areas, the ambient noise level may be above Ldn 65, so structures in the Ldn 60 to 65 must be evaluated on a case by case basis."

Typical construction in Hawaii and construction anticipated for the Ewa Marina Community is not to be of single wall construction, but typical of construction throughout the southern states.

- e., f., g., h., i. Enclosed is a copy of the Department of Land and Natural Resources comments on the Draft EIS and our response to their comments. Please note the Archaeological Mitigation Plan. This plan has been incorporated into the Final EIS.
- j. The reference to similar sites in the Ewa Plain has been deleted.
- k., l. Please refer to the enclosed proposed Archaeological Mitigation Plan.

Yours very truly,

DAMES & MOORE

Jennifer J. Klevend  
Assistant Environmental Scientist

JJK:ob(2446A/1298:13822-001-11)

Attachments: DLNR Letter, 13 November 1985  
Dames & Moore Letter, 14 December 1985

U.S. Department  
of Transportation  
United States  
Coast Guard



Commander (dpl)  
Fourteenth Coast Guard District

Prince Kalanianaʻole  
Federal Building  
300 Ala Moana Blvd.  
Honolulu, Hawaii 96850  
Phone:

(808) 546-2861

D24

16475.2/2-85  
Serial No. 6/014  
November 5, 1985

1985 NOV -7 PM 1:45  
DEPT. OF LAND UTILIZATION  
CITY & COUNTY OF HONOLULU

Mr. John P. Whalen, Director  
Department of Land Utilization,  
City & County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Re: Draft EIS, Proposed Ewa Marina Community Increment II

We have reviewed the above-referenced project, and have the following comments on it:

1. Aids to Navigation. The aids to navigation proposed for marking the entrance channel, as discussed on page 4-4 and illustrated in Figure 4-12, conform with U.S. Coast Guard requirements and should provide for safe and reliable marking for mariners in the area.

2. Vessel Safety. The Coast Guard's first comment on this project [Enclosure (1)] was in our review of the Programmatic EIS in December 1980. At that time, the marina was proposed to accommodate 2500 boats, and our comments noted that this would cause a substantial increase in vessel traffic close to the Pearl Harbor entrance, a small arms firing range, and a marine prohibitive zone. We received a reply [Enclosure (2)] acknowledging that 2500 boats would represent a substantial increase in vessel traffic in this area, but there was no analysis of how this increase might affect vessel safety. That the marina size has been reduced from 2500 to 1600 boats does not change the fact that this would create a significant increase in traffic. Enclosure (2) also disclaimed possible interference with naval operations based on the fact that the Navy had not cited such interference in their reply to the Programmatic EIS. While this probably indicates that there in fact is no potential problem, the Navy should be contacted directly to verify this.

3. Water Quality. The Coast Guard's response in Enclosure (1) also recommended that the marina development include: a disposal facility for vessels utilizing Type III Marine Sanitation Devices and portable toilets; waste oil storage facilities for both the marina and the housing project, for those who prefer to empty their oil themselves; and a small oil spill clean-up capability in the event of a spill. We also recommended that subsequent iterations of the EIS address the impact on water quality from boats which discharge treated sewage.

The response in Enclosure (2) indicated that disposal facilities for untreated sewage and waste oil, and a small spill clean-up capability, would probably be included in the project plans. There appears to be no discussion of this in the subject document under review, nor is there mention of the impact of vessel-generated sewage on water quality.

To sum up, we feel that our earlier concerns on vessel traffic safety and water quality still apply and have not yet been addressed adequately. These concerns should be explored in the final EIS for Increment II.

Thank you for the opportunity to comment on this document.

Sincerely,

J.V. MILBRAND  
Commander, U. S. Coast Guard  
District Planning Officer  
Fourteenth Coast Guard District  
By direction of the District Commander

Encl: (1) Fourteenth Coast Guard District letter dated 23  
December 1980

(2) Collaboration, Inc. letter dated 5 January 1981



(dpl)

Serial 559  
11000

23 DEC 1960

Department of Land Utilization  
City and County of Honolulu  
450 South King Street  
Honolulu, Hawaii 96813

Gentlemen:

The Fourteenth Coast Guard District is concerned about the proposed Eva Marina Community Project's impact on both safe navigation and the marine environment. Consequently, we submit the following comments and suggestions for the project's Environmental Impact Statement (EIS).

The 2500 recreational boats which will be accommodated at the proposed marina may cause a substantial increase in vessel traffic close to the Pearl Harbor entrance, a small area fishing range, and a marine prohibitive area. The impact of this vessel traffic, and its possible interference with naval operations, should be considered in the EIS.

The Coast Guard may require that the entrance channel to the marina be marked with private aids to navigation.

In reference to the marine water quality statements in paragraph 3.1.4.2, not all vessels have no discharge (Type III) marine sanitation devices (MSDs). Some vessels have Type I and II which discharge treated sewage and some have portable toilets which are not regulated and might be dumped over the side. The Coast Guard has no statistics validating your claim that "recreational boat operators as a group have always been sympathetic with local non-discharge ordinances, and have complied voluntarily."

We recommend that a disposal facility for Type III MSDs and portable toilets be installed at the marina. These toilets are probably emptied at sea at the present time. We also recommend that the EIS consider the possible problem of sewage from live aboards.

In addition to the problem of sewage pollution, the Coast Guard is also interested in preventing oil pollution. We recommend that the marina have a waste oil facility for owners who wish to empty their oil themselves. We also recommend that the housing project have a waste oil facility. As a final suggestion, the marina should have a small oil spill clean-up capability in case a spill does occur.

Enclosure (1)

the proposed marina's fueling facilities may be regulated by 33 CFR 154 and 155. However, these regulations are only for facilities involved in the bulk transfer of oil to or from a vessel that has a capacity of 150 or more barrels of oil.

Thank you for the opportunity to comment on your proposed project's EIS. If you have any questions concerning the comments or suggestions, please contact JOHN DEBORAH COOK at 544-2332.

Sincerely,

J. E. SCHMARTZ  
Commander, U. S. Coast Guard  
District Planning Officer  
Fourteenth Coast Guard District  
By Direction

Copy to: Office of Environmental Quality Control  
350 Haleakala St., RM 301  
Honolulu, HI 96813

MSI & Associates  
c/o Group Architects Collaborative, Inc.  
925 Bethel St.  
Honolulu, HI 96813  
Commandant (G-MS-1)

cc: dpl, map, oan



**COLLABORATION, INC.**

926 BETHEL STREET HONOLULU, HAWAII 96813 TELEPHONE (808) 533-1725

January 5, 1981

Commander J. E. Schwartz  
Office of the Commander  
14th Coast Guard District  
PJKK Federal Building  
300 Ala Moana, 9th Floor  
Honolulu, Hawaii 96850

Ref: 97878

Dear Commander Schwartz:

Subject: Ewa Marina Community Project  
Environmental Impact Statement

We have received your undated comments, serial 569 1100, regarding the Environmental Impact Statement for the Ewa Marina Community Project.

We agree that the introduction of 2,500 recreational boats may cause a substantial increase in vessel traffic close to the Pearl Harbor entrance. The small arms firing range should present no hazard to recreational boating if the established prohibitive area restrictions are observed. Restrictions in the marine prohibitive area should not be impacted by increased boating although the potential for inadvertent violation will certainly be increased. The possible interference with naval operations was not cited by the U.S. Navy in their response to the E.I.S.

If the Coast Guard requires that the entrance channel be marked with private aids to navigation, the developers will do so.

Releasing sewage from boats into the marina will require firm enforcement policies by a community management association responsible for maintaining the quality of the community environment as well as the marina. Projecting the amount of discharge in violation of marina rules is a difficult, if not impossible, task. Further studies on water quality in the marina will compare existing marinas and perhaps some conclusions can be drawn from their experience. Concerning your lacking statistics to support the statement regarding

FILE  
JEB  
copy to ocan  
+ me p  
26 JAN 81



Commander J. E. Schwartz  
14th Coast Guard District  
Subject: Ewa Marina Community Project  
Environmental Impact Statement  
January 5, 1981

Page 2

voluntary compliance, that was a subjective comment made by our consultants based on many years' experience in marina development.

Your recommendations for installation of a disposal facility for Type III MSDs and portable toilets and a waste oil facility are appreciated. The developers will be advised and since the success of the project is directly related to marina quality, installation will probably be incorporated in the plans. A small oil spill clean-up capability also would appear essential in marina maintenance.

It is not anticipated that bulk transfer of oil to or from a vessel within the marina would exceed 250 barrels. However, if this changes, we would certainly adhere to any and all applicable regulations.

Thank you for your response.

Sincerely,

COLLABORATION, INC.

Walter K. Tagawa

WKT:BP:ca

Enclosure (2)



## Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

U. S. Department of Transportation  
United States Coast Guard  
Federal Building  
300 Ala Moana Boulevard  
Honolulu, Hawaii 96850

D24

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Attention: Mr. J. F. Milbrand  
Commander

Dear Mr. Milbrand:

Thank you for reviewing the Draft EIS. We have received your letter of November 5, 1985 and offer the following response to your comments.

### 2. Vessel Safety.

Section 6.4.8 Recreation, Subheading Boating, has been expanded to acknowledge potential safety problems with increased vessel traffic.

The developer will contact the Navy regarding this potential problem.

### 3. Water Quality.

Vessels will be prohibited from discharging wastes of any kind into the marina and at least one pump-out station will be provided at a convenient location in one or more of the public mooring areas. This sentence has been included in Section 6.1.2 of the EIS.

Yours very truly,

DAMES & MOORE



Jennifer J. Kleveno  
Assistant Environmental Scientist



U.S. Department  
of Transportation  
Federal Aviation  
Administration

AIRPORTS DISTRICT OFFICE  
BOX 50244  
HONOLULU, HI 96850-0001  
Telephone: (808) 546-7129

10 /

October 10, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization, C&C Hnl.  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

We have reviewed the Draft Environmental Impact Statement for Increment II Proposed Ewa Marina Community dated September 20, 1985. While we have no substantive comments on the Draft EIS, our concern is that development of the marina may trigger future residential development within the noise impacted areas surrounding Honolulu International Airport. Particularly, since overflying aircraft are descending to Runway 8L, the primary landing runway. It is noted that under an Amendment to the Ewa Development Plan, residential and apartment units are to be restricted to areas exposed to 62.5 Ldn or less. We trust that strict and enforceable measures will be established to ensure compliance with these regulations. Also, our recommendation is that the national standard of 65 Ldn be lowered to 60 Ldn because of the open life style prevalent in Hawaii.

We appreciate the opportunity to review and comment on this Draft EIS.

Sincerely,

DAVID J. WELHOUSE  
Planning Engineer

Henry A. Sumida  
Airports District Office Manager

cc:  
State DOT-Airports  
✓ Dames & Moore

**Dames & Moore**



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3385  
Cable address: DAMEMORE

October 28, 1985

Mr. David J. Welhouse  
U. S. Department of Transportation  
Federal Aviation Administration  
Airports District Office  
Box 50244  
Honolulu, Hawaii 96850-0001

D7

Dear Mr. Welhouse

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 10, 1985, and will be including your comments in the Final EIS.

The Ewa Marina Community development has been designed so that all residential and apartment units will be constructed in areas exposed to less than 62.5 Ldn.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B(8):13822-001-11)





United States Department of the Interior

FISH AND WILDLIFE SERVICE

100 ALA MOANA BOULEVARD  
P. O. BOX 51157  
HONOLULU, HAWAII 96810

WE BEGLEY REFER TO  
ES  
Room 6307

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Re: Draft Environmental Impact Statement (DEIS), Increment II,  
Proposed Ewa Marina Community, Ewa, Oahu

Dear Mr. Whalen:

The U.S. Fish and Wildlife Service has reviewed the referenced DEIS and offers the following comments for your consideration.

General Comments

The Service's primary concerns regarding the proposed project are the potential impacts of the proposed dredging of the entrance channel, construction of the marina and groins, and the increased discharge of low-salinity runoff water into the marina and adjoining coastal waters on nearshore marine fishery resources, marine endangered species, and degrading coastal water quality and the preservation of the nine-acre *Ratis maritima* wetland.

Specific Comments

a. 4.2.2. Entrance Channel. The Final EIS should include an alternative that protects the marina from waves and surge without a breakwater. This alternative should include a wave absorbing basin at the mouth of the marina and a different marina alignment.

b. 4.2.4. Drainage into Marina. We recommend that drywells, surface ponds, landscaped areas, and parks be used to the fullest to limit discharge of runoff waters into the marina and adjoining nearshore waters. Culverts that discharge directly into the marina may introduce waste petroleum products and other toxic materials during heavy rains.

c. 6.2. Biological Impacts. The Service is pleased that the developer has designated the nine-acre *Ratis maritima* wetland for preservation. The Final EIS would be enhanced by a discussion of how the wetland would be preserved and the location of the wetland in relation to adjoining land uses. Our office is particularly interested in measures to enhance endangered

waterbird use of the wetland. We are available to meet with the developer to recommend enhancement measures.

d. 5.8 Marine and Shoreline Environment. This section should include a list of endangered and threatened marine species that may frequent the area. This information should be coordinated with the National Marine Fisheries Service.

e. 6.2.2. Marine Impacts. We recommend that silt curtains or other silt containing devices be used to limit silt and suspended sediment loads to the dredge area.

f. 6.2.2. Marine Impacts. It is likely that the still-enclosed marina basin would be turbid and contain a high level of suspended sediments. The opening of the entrance channel would introduce large amounts of suspended sediments into the nearshore waters which may smother or reduce the productivity of corals and algae. The Service recommends that the entrance channel be opened when the turbidity and suspended sediments within the marina approximate the nearshore waters.

g. 6.2.2 Marine Impacts. The DEIS states that the entrance channel would be recolonized by algae and the cover would resemble that found at similar depths at the site. Algal cover and composition would be a function of substrate, wave action, grazing pressure as well as depth.

The Final EIS should discuss the anticipated salinity levels within the marina. If groundwater intrusion into the marina basin is substantial, the resulting low salinity marina waters may hinder recovery of marine communities affected by the dredging.

We understand there is an opening in the limestone caprock or a shallow "well" that contains the endemic shrimp *Halocaridina rubra*. This "well" and the presence of the shrimp should be determined for inclusion in the Final EIS.

We appreciate the opportunity to comment.

Sincerely,

Ernest Kosaka  
Project Leader  
Office of Environmental Services

cc: Dames and Moore  
NMFS - WPPD  
CE



Save Energy and You Serve America!

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

United States Department of the Interior  
Fish and Wildlife Service  
P. O. Box 50167  
Honolulu, Hawaii 96850

Attention: Mr. Ernest Kosaka  
Project Leader  
Office of Environmental Services

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Kosaka:

Thank you for reviewing the Draft EIS. We have received your letter of October 1985 and offer the following response to your concerns.

a. 4.2.2. Entrance Channel

The marine design engineers, Moffatt & Nichol, have developed the proposed marina and several alternative marina configurations. The alternative of a marina without jetties is assessed in the Draft EIS. Even with the addition of a wave absorbing basin at the mouth of the marina, breaking waves in the channel would create a navigational hazard. This design was not considered to be a reasonable alternative for a small craft harbor containing 1,600 boats.

b. 4.2.4. Drainage Into Marina

Drywells, surface ponds, landscaped areas, and parks will be used as part of the drainage system.

c. 6.2.. Biological Impacts

The developer will meet with the Fish and Wildlife Service to discuss enhancement of the wetland area.

D13

**Dames & Moore**

United States Department of the Interior  
December 4, 1985  
Page 2

d. 5.8. Marine and Shoreline Environment

This section has been expanded to include a list of endangered and threatened marine species.

e. 6.2.2. Marine Impacts

The use of silt curtains or other silt containing devices will be specified in the construction documents.

f. 6.2.2. Marine Impacts

The Draft EIS has been modified to specify that algal cover and composition would be a function of substrate, wave action, grazing pressure, as well as depth.

A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina, including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II.

As coordinated with your department, a field trip attended by the Corps of Engineers, the Fish and Wildlife Service, Buddy Neller, and Dames & Moore will be conducted to determine the absence or presence of the endemic shrimp *Halecaridina rubra*. Results of this field trip will be incorporated into the Corps' EIS for the Ewa Marina Community.

The possible presence of this shrimp has been included in the Final EIS.

Yours very truly,

DAMES & MOORE

*Jennifer J. Klevono*  
Jennifer J. Klevono  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13B22-001-11)

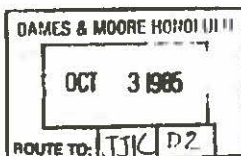




## United States Department of the Interior

GEOLOGICAL SURVEY  
Water Resources Division  
P.O. Box 50166  
Honolulu, Hawaii 96850

October 1, 1985



Mr. John P. Whalen, Director  
Department of Land Utilization  
City & County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Environmental Impact Statement (EIS)  
Proposed Ewa Marina Community Increment II

The subject EIS was reviewed by Kiyoshi J. Takasaki of this office. Mr. Takasaki's review comments follow:

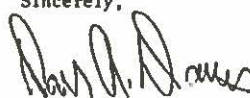
Page	Paragraph	Line	Comments
4-12	2	All	Location of the proposed non-potable supply sites should be specified because they may affect the quality of the water in existing wells in the area.
5-5	5	2	Change "Waianae Volcanic Series" to read "Koolau Volcanics".
5-5	6	3	Change "Waianae Volcanic Series" to read "Koolau Volcanics".
	6	1	Change "Waianae Volcanic Series" to read "Koolau Volcanics".
	6	4	Delete "fresh" and change "Waianae Volcanic Series" to read "Koolau Volcanics".
	8	1	Change "Waianae Range" to read "Koolau Range".
		2	Change "Waianae Volcanic Series" to read "Koolau Volcanics".
	9	All	Delete entire paragraph. There are no wells that tap the volcanic aquifer in the immediate area. The estimated chloride concentration of the water on the underlying volcanic aquifer is between 5,000 to 10,000 mg/L.
5-6	1	1,2	Delete "by discharge from the Waianae Volcanic Series".
6-2	2	1 to 3	The probable effect on the salinity of the water for existing wells should be addressed in some detail.

Page	Paragraph	Line	Comments
6-2	2	4-6	Delete entire sentence starting with "Construction of the..." and ending with "underlying Waianae Volcanic Series".

If you have questions about the above or wish to discuss the review comments, you may contact Kiyoshi Takasaki at 546-8331

We appreciate the opportunity to review the subject EIS and trust that the review comments will prove helpful.

Sincerely,

  
Stanley K. Kapustka  
District Chief

Enclosure

cc: James & Moore, Attn: Jennifer J. Kleveno, Honolulu, Hawaii  
Office of Environmental Quality Control, Honolulu, Hawaii

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORF

December 4, 1985

United States Department of the Interior  
Geological Survey  
Water Resources Division  
P. O. Box 50166  
Honolulu, Hawaii 96850

Attention: Mr. Stanley R. Kapustka  
District Chief

Dear Mr. Kapustka:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 1, 1985 and offer the following responses to your comments.

Page	¶	Line	Response
4-12	2	All	A map showing the location of the proposed non-potable supply wells has been provided in the Final EIS.
5-5	5	2	"Waianae Volcanic Series" has been changed to "Koolau Volcanics."
	6	1	"Waianae Volcanic Series" has been changed to "Koolau Volcanics."
	6	3	"Waianae Volcanic Series" has been changed to "Koolau Volcanics."
	6	4	"fresh" has been deleted and "Waianae Volcanic Series" has been changed to "Koolau Volcanics."
	8	1	"Waianae Range" has been changed to "Koolau Range."
	8	2	"Waianae Volcanic Series" has been changed to "Koolau Volcanics."
	9	All	This paragraph has been deleted.
5-6	1	1,2	"by discharge from the Waianae Volcanic Series" has been deleted.

U.S. Dept. of the Interior  
December 4, 1985  
Page 2

**Dames & Moore**

Page	¶	Line	Response
6-2	2	1-3	A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II.
6-2	2	4-6	This sentence has been deleted.

Yours very truly,

DAMES & MOORE

*Jennifer J. Kleveno*  
Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)

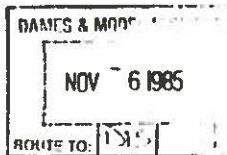


cc: Dames & Moore

UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

SOIL  
CONSERVATION  
SERVICE

P. O. BOX 50004  
HONOLULU, HAWAII  
96850



November 4, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City & County of Honolulu  
650 South King Street  
Honolulu, HI 96813

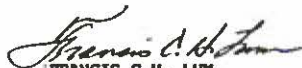
Dear Mr. Whalen:

Subject: Draft EIS - Increment II, Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

We reviewed the subject draft environmental impact statement and have no comments to make.

Thank you for the opportunity to review the document.

Sincerely,

  
FRANCIS C.H. LUM  
State Conservationist

cc:  
Dames & Moore  
Attention: Jennifer J. Kleveno  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

**Dames & Moore**



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3185  
Cable address: DAMEMORE

December 4, 1985

United States Department of Agriculture  
Soil Conservation Service  
P. O. Box 50004  
Honolulu, Hawaii 96850

D15

Attention: Mr. Francis C. H. Lum  
State Conservationist

Dear Mr. Lum:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

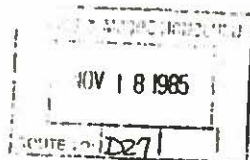
Thank you for reviewing the Draft EIS. We have received your letter of November 4, 1985 and understand that you have no comments.

Yours very truly,

DAMES & MOORE

  
Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B(14):13822-001-11)



11610  
Ser UGH/ 324  
15 NOV 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, HI 96813

Dear Mr. Whalen:

Draft  
Environmental Impact Statement (EIS)  
Increment II  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

We have reviewed the subject Draft EIS as requested by Director, State of Hawaii  
Office of Environmental Quality Control letter of September 24, 1985.

The western portion of Increment II of the proposed Ewa Marina development underlies major flight paths of Naval Air Station, Barbers Point and thus is affected by the provisions of the Navy's Air Installation Compatible Use Zone (AICUZ) Program. The subject document accurately depicts the Ldn contours and Accident Potential Zones (APZ) of the current NAS Barbers Point AICUZ Plan. As stated in the EIS, these noise sensitive and accident potential areas require guidelines which restrict certain types of development, including residential.

The proposed commercial development of that portion of Ewa Marina Increment II which underlies the NAS Barbers Point AICUZ boundary is considered compatible if it is accomplished in accordance with table 5-21 and figure 5-9 of the subject EIS. However, noise from aircraft operating from and into both NAS Barbers Point and Honolulu International Airport/Hickam AFB will be prevalent over the entire Ewa Marina community and occasional deviation from regular flight paths could create annoying aircraft noise in those areas planned for residential development. Accordingly, the Navy fully supports the Honolulu International Airport and Environs Master Plan Study of June 1981 which recommends a truth-in-sales ordinance for residential use in areas above 60 Ldn.

A major concern by this command is the detrimental effect that shoreline construction could have on tidal currents along the South shores of NAS Barbers Point. A case in point is the recent erosion pattern along Edgewater drive at Iroquois Point Housing that now threatens to condemn approximately six senior officers' quarters. These homes have been in existence since 1959 and the recent redefining of the shoreline along this area may have been the result of coastal construction.

The beaches of NAS Barbers Point are the locations for many recreational facilities including beach cottages, and a restaurant facility. Although Himitz Beach was addressed adequately, of greater concern is White Plains Beach which is located adjacent to the west boundary of the proposed development and was not assessed in this report. In addition the Western most beaches of the station contain natural Hawaiian species of foliage guarded by the EPA. NAS Barbers Point does not have the expertise to adequately assess the potential for shoreline damage that could be caused by the proposed construction, but requests that these concerns are addressed in greater detail in the environmental impact statement.

Sincerely,

H. B. ROBINS, JR.  
Captain, U. S. Navy  
Commanding Officer

Copy to:  
Dames and Moore  
COMNAVBASE PEARL  
COMNAVFACENGCON





## Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

Department of the Navy  
Naval Air Station  
Barbers Point, Hawaii 96862-5050

D27

Attention: Capt. H. B. Robbins, Jr.  
Commanding Officer

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

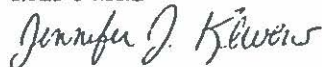
Dear Capt. Robbins:

Thank you for reviewing the Draft EIS. We have received your letter of November 15, 1985 and offer the following response to your concerns.

On the Draft EIS, the area designated as "Nimitz Beach" refers to all sand beaches along the shoreline beginning at the project's west jetty and extending westward through the Barbers Point boundary. If this area experiences loss of sand in an amount equivalent to that which is accreted on the east side of the jetty, sand will have to be replaced at regular intervals by bypassing.

Yours very truly,

DAMES & MOORE



Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)



DEPARTMENT OF THE NAVY  
HEADQUARTERS  
NAVAL BASE PEARL HARBOR  
BOX 110  
PEARL HARBOR, HAWAII 96860-5020

11010  
002(09P2)2031

4 OCT 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii, 96813

Dear Mr. Whalen:

Draft Environmental Impact Statement (EIS)  
Increment II, Proposed Ewa Marina  
Ewa, Oahu, Hawaii, Dames & Moore  
(September 20, 1985)

Thank you for your transmittal of September 24, 1985, providing the draft EIS for review and comment. It is understood that a previous EIS was written to cover the Ewa Marina Community concept and a previous Supplemental EIS was written to cover Increment I. The Navy did not receive a copy of the EIS Preparation Notice for Increment II and therefore no preliminary comment from the Navy is found in Appendix C.

Throughout the development of Ewa Marina project, the Navy has consistently indicated the problems of placing such a residential project in close proximity to Barbers Point Naval Air Station and Honolulu International Airport. The discussion of "Acoustics" on Pages 5-20 through 5-23 and "Accident Potential Zone" on Pages 5-23 through 5-24 adequately addresses land impacts but should be expanded to address impacts on occupants and users of the proposed development.

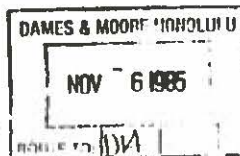
Naval Air Station, Barbers Point will provide comments separately on this draft EIS.

Thank you for the opportunity to comment on the EIS.

Yours truly,

P. O'CONNOR  
Captain, U.S. Navy  
Chief of Staff

Copy to:  
Dames & Moore  
ATTN: Ms. Jennifer J. Kleveno  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii, 96816



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

Department of the Navy  
Headquarters  
Naval Base Pearl Harbor  
Box 110  
Pearl Harbor, Hawaii 96860-5020

Attention: Capt. P. O'Connor  
U.S. Navy  
Chief of Staff

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Capt. O'Connor:

Thank you for reviewing the Draft EIS. We have received your letter of October 4, 1985 and offer the following response to your concerns.

In the development of standards for allowable noise levels, the impact on occupants and users have been considered in each of the land use categories. As stated in Table 5-21, the compatibility matrix has been determined by a number of noise sensitivity factors including: speech communication needs; subjective judgements of noise compatibility and relative noisiness; need for freedom from noise intrusions; sleep sensitivity criteria; accumulated case histories of noise complaint experience; and typical noise insulation provided by common types of building construction. Accident Potential Zone compatibility standards likewise assess the impact on occupants and users. See Figure 5-9 of the Draft EIS.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)



**Dames & Moore**



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

October 28, 1985

(P)1721.5

DIO

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Proposed Ewa Marina Community Increment II

We have reviewed the subject document and have no  
comments to offer.

Very truly yours,

TEUANE TOMINAGA  
State Public Works Engineer

SM:jk  
✓cc: Dames & Moore

Department of Accounting and General Services  
Division of Public Works  
P. O. Box 119  
Honolulu, Hawaii 96810

D10

Attention: Mr. Teuane Tominaga  
State Public Works Engineer

Dear Mr. Tominaga:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of  
October 23, 1985, and understand that you have no comments.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleven  
Assistant Environmental Scientist

JJK:ob(2446A/129B(11):13822-001-11)

GEORGE R. ARIVOSH  
GOVERNOR



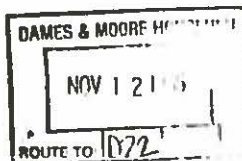
State of Hawaii  
DEPARTMENT OF AGRICULTURE  
1428 So. King Street  
Honolulu, Hawaii 96814

JACK K. SUWA  
CHAIRMAN, BOARD OF AGRICULTURE

SUZANNE D. PETERSON  
DEPUTY TO THE CHAIRMAN

Mailing Address:  
P. O. Box 22159  
Honolulu, Hawaii 96822

November 7, 1985



MEMORANDUM

To: Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu

Subject: Supplemental Draft Environmental  
Impact Statement (EIS) and Zone Change  
Application for Proposed Ewa Marina Community  
(Increment II)  
Dames and Moore/MSM and Associates, Inc.  
TMK: 9-1-12: 7-17, Por. 2, 5 and 6  
Ewa, Oahu  
Acres: 460.2

The Department of Agriculture has reviewed the subject application and Draft EIS and offers the following comments.

Pursuant to your request, this is a combined response to the Supplemental Draft EIS and Zone Change Application for the proposed Ewa Marina Community (Increment II).

It is our understanding that the Draft EIS builds upon the generic EIS (accepted by DLU, February 20, 1985) and uses extensively the information found in the Supplemental EIS for Increment I (accepted by DLU, April 16, 1985). This Draft EIS is to be used for the State Conservation District Use application and the County Special Management Area application.

Our concerns largely reflect those expressed in our comments on the State Land Use Boundary Amendment petition for a 181-acre portion of the proposed project (see attached copy of memorandum dated November 15, 1983), and the EIS and rezoning

Mr. John P. Whalen  
November 7, 1985  
Page 2

applications prepared for Increment I of the Ewa Marina Community (see attached copies of memoranda dated November 30, 1983; December 5, 1983; February 1, 1984; February 17, 1984).

We understand that the approval and subsequent construction of Increment II would result in the withdrawal of approximately 400 acres of land under sugarcane cultivation by Oahu Sugar Company (Draft EIS, page 6-11). As indicated in our comments on Increment I, we believe that Oahu Sugar Company should be allowed to continue cultivation of the lands within Increment II until such time as the land is actually needed for development.

Also to be affected by Increment II is an egg operation which, to our knowledge, is a "good-sized" operation (refer to our memorandum dated November 15, 1983). There is no indication in either subject document if any action will be taken to lessen the impact of the termination of the egg operation or any other existing agricultural operations as a result of the proposed project. In fact, we understand that the landowner is seeking the eviction of the egg operation in court. This is precisely the kind of confrontation between agriculture and urbanization which we believe should be avoided.

Both documents indicate that potable water sufficient to meet the demand expected from Increment II could be made available through one or a combination of several means (Draft EIS, page 4-11; Rezoning Application, page 48-50). The source for non-potable water for irrigation and non-domestic use is proposed to be brackish groundwater resources in the project area. Our concern is that the reallocation of potable and non-potable water resources in the region to non-agricultural uses should not result in the abandonment or preclusion of existing and future agricultural activities.

The Ewa Marina Community project is but one of five planned and/or proposed major developments within the Ewa and Central Oahu areas (West Beach/Ewa City Center, Waikale, Mililani expansion, and Waiawa). Any combination of these projects will have major impacts upon the availability and capacities of natural and man-made resources and the direction and magnitude of urbanization. We believe that the required Environmental Impact Statements for these and other projects in the region should include an analysis of the cumulative impacts of



Mr. John P. Whalen  
November 7, 1985  
Page 3

their respective proposals, and that these EIS's should be made available as early as possible in the development approval process.

Thank you for the opportunity to comment.

*Jack K. Suwa*  
JACK K. SUWA  
Chairman, Board of Agriculture

Attachments

cc: Dames and Moore, Jennifer J. Kleveno  
DPED  
DGP  
OEQC

November 15, 1985

Handwritten: 11-15-85, 11:15 AM

Handwritten: C-2

DAMES & MOORE HONOLULU	
NOV 12 1985	
ROUTE TO:	

MEMORANDUM

To: Mr. Kent M. Keith, Director  
Department of Planning and Economic Development

Subject: Petition for an Amendment to the State Land Use  
District Boundaries  
A13-558 (HCH and Associates, Inc.)  
Agricultural to Urban  
Marina-Oriented Residential Community  
TRK: 9-1-12: 7, 8, 9, 11, 12, 13, 16, 17, par. 5  
Oneula, Ewa, Oahu - 101 acres

The Department of Agriculture has reviewed the subject petition and offers the following comments.

According to the petition, the applicant is seeking to reclassify approximately 101 acres of land from the Agricultural District to the Urban District for the development of residential units and associated facilities. The subject area is to be part of a 797.6 acre master-planned area to be known as the Ewa Marina Community.

The northern 35+ acres of the subject area are utilized for production of sugarcane by Oahu Sugar Company (OSC). The southern 96 acres are not cultivated but support " ... low intensity agricultural activities including 42 acres for egg production and poultry production" (Petition, page 2). The leases for these activities have been terminated since mid-1980 and the remaining operations are on a month-to-month arrangement (Petition, page 38).

The reference to the Soil Conservation Service Soil Survey is correct. It should be noted that the Agricultural Lands of Importance to the State of Hawaii (ALISH) system was jointly developed by the Soil Conservation Service, University of Hawaii College of Tropical Agriculture, and the State Departments of Agriculture, Planning and Economic Development, and Land and Natural Resources. The subject area has Land Study Bureau Overall Productivity Ratings of 8771, E115, and Urban. By this method of classification, the "B" -rated area has good to very good productivity potential for sugarcane, pineapple, and vegetable crops.

While the loss of 413 acres in sugarcane cultivation (including the 86 acres in the present petition) as a result of the development of the entire Ewa Marina Community project may not have significant adverse effects

Mr. Kent H. Keith  
Page -2-  
November 15, 1983

on the economic viability of the Oahu Sugar Company, we believe that the company should be allowed to continue cultivation on the lands within the project area until such time as the land is actually needed for development. The company recently reviewed all its cultivated lands to identify those to be kept or phased out of sugar production, on the basis of relative operating costs for irrigation water pumpage, yield potential, and other factors. The subject property is among the lands to be kept in production.

Plan Inc., an egg operation, currently leases twelve (12) acres on a month-to-month basis from the Campbell Estate in the project area and maintains a 40,000 layer facility at its Ewa site. Industry experts consider this operation to be "good-sized" as Oahu egg-laying operations go. A company spokesman stated that to phase out and re-establish their operation in another location would take approximately 5 to 10 years.

The petition does not state whether any action will be taken to lessen the impact of the termination of the egg operation or any other existing agricultural operations as a result of the proposed project. This raises the following questions:

- (1) What are the replacement costs for the operations affected by the proposed project?
- (2) Have any of these operations expressed an interest in relocation?
- (3) If so, will relocation lands be made available and at what cost?
- (4) What lease terms can relocated farmers expect?
- (5) Are there any dwellings or facilities to be moved and/or rebuilt?

According to the Statistics of Hawaiian Agriculture, 1982, Oahu egg producers supplied 84 percent of all eggs produced in the State in 1982. During that same year, the total market supply of eggs in the State was 22.25 million dozens, of which 16.35 million dozens (76 percent) were produced locally (Statistics, page 83 and 84). The Poultry and Eggs Industry Analysis No. 2 (submitted to the Governor's Agriculture Coordinating Committee on January 27, 1982) states that except for milk production, eggs are the only livestock commodity presently being produced at such a high level of self-sufficiency in Hawaii (Analysis, page 3).

The Department of Agriculture strongly supports agricultural self-sufficiency for Hawaii, pursuant to the mandates, objectives, policies, and actions found in the following documents:

- (1) The State Constitution which mandates that the State shall "... increase agricultural self-sufficiency ..." (Article XI, Section 3).

Mr. Kent H. Keith  
Page -3-  
November 15, 1983

- (2) The Hawaii State Plan (Chapter 226, HRS) which contains a policy promoting economically competitive activities that increase Hawaii's agricultural self-sufficiency [Section 226-7 (b)(10) of the Hawaii Revised Statutes].
- (3) The State Agriculture Plan (May 3, 1982) which contains several policies and implementing actions related to increasing agricultural self-sufficiency.

The petition notes that the Board of Water Supply recently adopted a dual water system plan for the Ewa area, and detailed planning is in progress (Petition, page 9 and 10). However, the petition does not indicate the total domestic water demand required for the total 737.6 acre project, nor the impact on agriculture resulting from the withdrawal of water from sugarcane irrigation and its reallocation to other uses.

The petition concludes that excavations for the proposed marina and waterway system will not significantly affect the amount of seawater contamination of groundwater in the project area (Petition, page 36). What level of increased salinity is considered not significant? We are aware that OSC has an irrigation water pumping station to the west of the project area and five (5) pumps to the northeast of the project area. Is there any possibility that salinity concentrations in these wells could rise as a result of the excavation of the waterways? Soils become saline as a result of the use of saline irrigation water, especially in dry areas where the accumulated salts are not washed out by frequent rainfall or by freshwater flushing. Saline soils have a retarding effect on the growth of sugarcane, thus reducing the yields from plants in the affected area.

The petition also states that "... there should be a tendency for groundwater to move seaward rather than the reverse" (Petition, page 36). Would the excavation of the waterways and marina result in a groundwater flow out of the excavated area at a rate significantly greater than what presently occurs?

If this petition is approved, we recommend the following conditions:

1. Allow Oahu Sugar Company to continue production on any of its lands in the petition area until construction of each phase actually requires the conversion of such lands.
2. Provide for the relocation of the existing poultry/egg operation at Petitioner's expense to comparable lands at lease terms sufficient to maintain the economic viability of the operation.

For your information, please find attached a copy of our comments on the previous boundary amendment petition (Docket A79-469).

Thank you for the opportunity to comment.

*Jack K. Suna*  
JACK K. SUNA  
Chairman, Board of Agriculture

Attachment  
cc: DLHR  
Plan, Inc.  
Oahu Sugar Company, Ltd.



January 10, 1980

MEMORANDUM

To: Mr. Hideto Kono, Director  
Department of Planning and Economic Development

Subject: Petition for an Amendment to the SLUDR  
A79-469 - MSM and Associates, Inc.  
THK: 9-1-12: 7,8,9,11,12,13,16,17, & por. of 5 - Ewa, Oahu

The Department of Agriculture has reviewed the subject petition and offers the following comments.

1. The petition does not state the impact of the proposed change on the existing poultry/egg farm.
2. Approximately 85 acres of the subject parcel is classified as "Other Important Agricultural Land" according to the Agricultural Lands of Importance to the State of Hawaii classification system.
3. The petition states that it would be more advantageous to remove from production 85 acres currently in sugar cane. However, depending on future land use decisions in the area, the long-range effect of the withdrawals on Oahu Sugar Plantation may be significant.
4. There appear to be vacant lands within the State Land Use Urban District Boundary in proximity to the subject parcel. This Department believes that lands in agricultural use should be maintained in the Agricultural District insofar as practicable, and should not be reclassified to the Urban District unless it can be factually demonstrated that alternative lands for the proposed urban use are insufficient, unsuitable, or unavailable. We recommend that this issue be explored in depth at the time of hearing.

We appreciate the opportunity to comment.

*John Farias, Jr.*

JOHN FARIAS, JR.  
Chairman, Board of Agriculture

cc: George Moriguchi, CAC Planning Dept.

November 30, 1983

Mr. Gerald Takano  
GACI  
926 Bethel Street  
Honolulu, Hawaii 96813

Dear Mr. Takano:

Preparation Notice for Supplemental Environmental  
Impact Statements Pertaining to Increment I, Ewa  
Marina Community Project  
THK: 9-1-12: Portion of 5 - 174.7 acres *one ylo, Ewa, Oahu*

The Department of Agriculture has reviewed the subject preparation notice and offers the following comments.

According to the application, Increment I consists of 174.7 acres and represents the first phase of development of the total Ewa Marina Community project. The project site is on the easternmost portion of the total proposed project area and abuts Ewa Beach town.

The entire Increment I site is presently in sugarcane cultivation and the lands to the north and west are also devoted to cane cultivation.

The subject property is classified as "Other Important Agricultural Land" according to the Agricultural Lands of Importance to the State of Hawaii (ALISII) system. The Soil Conservation Service Soil Survey identifies the soils as: (1) Fill land (Fd) which is nearly level, (2) Ewa silty clay loam, moderately shallow (EnA) with 0 to 2 percent slopes which is used for sugarcane, truck crops, and pasture, (3) Ewa silty clay loam, moderately shallow (EnB) with 2 to 6 percent slopes which is used for sugarcane, truck crops, and pasture, and, (4) Mamala stony silty clay loam (MnC) with 0 to 12 percent slopes which is used for sugarcane, truck crops, and pasture. EnA, EnB, and MnC soils have crop capability classifications of IIs, IIe, and IIIs, respectively (soils with moderate to severe erosion or excess water problems).

The subject property has Land Study Bureau Overall Productivity Ratings of "B771" and "C721". By this method of classification, the property has fair to very good productivity potential for most agricultural uses.

Mr. Gerald Takano  
Page -2-  
November 30, 1983

On November 15, 1983, we commented on a petition for an amendment to the State Land Use Agricultural District Boundary for the 181 acre area to the west of the subject property (see attached Memorandum to the Department of Planning and Economic Development, Docket No. A83-558). We noted that Oahu Sugar Company recently reviewed all its cultivated lands to identify those to be kept or phased out of sugar production, on the basis of relative operating costs for irrigation water pumpage, yield potential, and other factors. Most of the Ewa Marina Community project area, including the subject 174.7 acre site, are among the lands to be kept in production.

We concluded that Oahu Sugar Company should be allowed to continue cultivation on the lands within the project area until such time as the land is actually needed for development. We believe that the company should be permitted to continue cultivation in the area surrounding the subject property.

Other issues that should be addressed in the supplemental EIS are the impacts of the subject development upon land productivity, agricultural production, and competition for use of water resources in the region. Specific losses to Oahu Sugar Company in terms of income, employment, and other agricultural factors should be discussed. Explanation should be offered as to why a productive area of the plantation is being developed first, rather than a site closer to the shoreline which is not in sugarcane.

Thank you for the opportunity to comment.

Sincerely,

*Jack K. Suma*

JACK K. SUMA  
Chairman, Board of Agriculture

Attachment

December 5, 1983

MEMORANDUM

TO: Mr. Michael M. McElroy, Director  
Department of Land Utilization  
City and County of Honolulu

SUBJECT: Request for Zone Change Ewa (Ewa Marina)  
MSM & Associates, Inc.  
R6 to B2; AG1 to P1, A1, and R6  
TRK: 9112: Portion of 5 9-1-12: Rn. 85  
Acres: 174.7

The Department of Agriculture has reviewed the subject request and offers the following comments.

According to the application material, the applicant's request represents the first phase of the proposed Ewa Marina Community project which is to encompass a total area of 730.5 acres. Approximately 169 acres of the property being considered for zone change is classified as AG1 and is in sugarcane cultivation.

Page 4 of Appendix "D" states that "The removal of these (subject) lands is part of Oahu Sugar Company's program to withdraw 5,000 acres from production." We are aware that Oahu Sugar Company recently reviewed all its cultivated lands to identify those to be kept or phased out of sugar production, on the basis of relative operating costs for irrigation water pumpage, yield potential, and other factors. Most of the Ewa Marina Community project area, including the subject 174.7 acres site, are among the lands to be kept in production.

In our comments on a petition for an amendment to the State Land Use Agricultural District Boundary for the 181 acre area to the west of the subject property (see attached Memorandum to the Department of Planning and Economic Development, November 15, 1983, Docket No. A83-558), and our comments on a Supplemental Environmental Impact Statement Preparation Notice relating to Increment I (see attached letter to Mr. Gerald Takano, November 30, 1983), we concluded that Oahu Sugar Company should be allowed to continue cultivation on the lands within the project area until such time as

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I 4-1-12: Rn. 85



Mr. Michael H. McElroy  
Page 2  
December 5, 1983

the land is actually needed for development. We also question why the subject area, a productive part of the plantation is being developed first rather than a site closer to the shoreline and not in sugarcane.

We do not agree with the statement that, "...the proposal itself will not directly affect the agricultural industry" (Appendix "D", page 4). Although it is stated that jobs in agriculture will not be lost as a result of project development, the approval and subsequent development of the proposed project will result in the irrevocable loss of agriculturally productive lands that are used for sugarcane cultivation, and according to our analysis, have potential for other agricultural uses such as vegetables and forage. Furthermore, the removal of the subject lands from cane production will result in the loss of marketable raw sugar and, therefore, income to Oahu Sugar Company.

Finally, the source (s) of domestic water for the proposed development is not clear as of this date. Hopefully, a forthcoming study (Application, pages 38-39) on this matter will provide better information and address agricultural water demand in the Ewa area.

Thank you for the opportunity to comment.

*Jack K. Suma*  
JACK K. SUMA, CHAIRMAN  
Board of Agriculture

Attachments

cc: DPED  
DGP

February 1, 1984

Mr. Tyrone T. Kusao, A.I.C.P.  
City Planning Consultant  
c/o Group Architects Collaborative, Inc.  
926 Bethel Street  
Honolulu, Hawaii 96813

Dear Mr. Kusao:

This is to thank you for your letter of January 23, 1984 regarding clarification of certain key issues relating to your rezoning request for Increment I of the Ewa Marina project (THK: 9-1-12: por. 5).

We note that you have no objection to allowing Oahu Sugar Company to continue sugarcane cultivation on both the lands under the rezoning request and those under petition with the State Land Use Commission until such time as the affected properties are needed for development.

We also note that you have concluded that the withdrawal of agricultural lands from agricultural use would directly affect the agricultural industry.

Thank you again for informing us of your intentions and thoughts on the above matters.

Sincerely,

*Jack K. Suma*  
JACK K. SUMA  
Chairman, Board of Agriculture

cc: DLU  
DPED - Land Use Division  
Oahu Sugar Co. - Mr. W.D. Balfour, Jr.

Handwritten notes: "Bing", "Ch", "85 2/17/84"

APPLICATIONS FROM "PROPERTY"

Mr. Michael M. McElroy  
Page 2  
February 17, 1984

February 17, 1984

MEMORANDUM

TO: Mr. Michael M. McElroy, Director  
Department of Land Utilization  
City and County of Honolulu

SUBJECT: Draft Supplemental Environmental Impact Statement (EIS)  
for Increment I, Ewa Marina Community Project  
M.S.H. and Associates, Inc.  
TRK: 9-1-12: Por. 5  
Honolulu, Ewa, Oahu  
Acres: 174.491

The Department of Agriculture has reviewed the subject draft supplemental EIS and offers the following comments.

The draft EIS states that the sugarcane yield from the area within Increment I is "...considered marginal and the distance to the sugar mill result in an uneconomic operation" (EIS, page 10). As noted in our letter to Mr. Gerald Takano of GACI, dated November 30, 1983 (copy may be seen in Appendix L of the draft EIS), Oahu Sugar Company recently reviewed all of its cultivated lands to identify those to be kept or phased out of sugar production, on the basis of relative operating costs for irrigation water pumpage, yield potential, and other factors. The sugarcane fields within Increment I are among those lands to be kept.

The draft EIS should address the impacts to Oahu Sugar Company that may result from the irrevocable loss of productive agricultural land. These losses include future income from sugar revenues, employment, and alternative agricultural uses of the land.

We note that Oahu Sugar Company will be allowed to continue sugarcane cultivation within the project area until such time as the affected properties are actually needed for development (EIS, page 11). This action would mitigate the short-time loss of income that would result from the untimely loss of immature sugarcane.

We have studied the proposed "A-Modified" scheme for the dual water system (EIS, pages 104-109) and found that there is no discussion of the proposed system's impacts upon the irrigation water needs of the Oahu Sugar Company in the Ewa area. Appendix "K" indicates that approximately 13.2 million gallons per day of brackish water from several Oahu Sugar Company wells will be allocated to existing and proposed east and west Ewa developments.

Pages 34 through 39 of the draft EIS, and Appendix "C" ("Hydrologic Report, by William Hee and Associates, Inc.) propose that a golf course be situated between the Ewa Town development area and the Ewa Marina site to act as a storm flow retention basin system. This proposed golf course is outside the site of the Ewa Marina project site but is considered a necessary part of the project. The development of the basin system will result in the termination of sugarcane cultivation in the area. The impacts associated with this additional loss of sugarcane cultivated land should be considered in the draft EIS.

Thank you for the opportunity to comment.

*Jack K. Suwa*  
JACK K. SUWA  
Chairman, Board of Agriculture

cc: MSM and Associates  
GACI

ist, ILMU)



## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3181  
Cable address: DAMEMORE

December 4, 1985

State of Hawaii  
Department of Agriculture  
1428 South King Street  
Honolulu, Hawaii 96814

D22

Attention: Mr. Jack Suwa  
Chairman, Board of Agriculture

Dear Mr. Suwa:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of November 7, 1985, and offer the following response to your comments.

Oahu Sugar Company will be allowed to continue cultivation of the lands within Increment II until such time as the land is actually needed for development.

Mr. Mike Warren of Campbell Estate was contacted in regards to the eviction of the egg operation. He informed us that an effort had been made to relocate the egg farm but that the owner had shown no interest in cooperating. Campbell Estate felt that they were left with no other recourse than to resort to legal actions.

Yours very truly,

DAMES & MOORE

  
Jennifer J. Kleven  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)

GEORGE R. ARYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF DEFENSE  
OFFICE OF THE ADJUTANT GENERAL  
3949 DIAMOND HEAD ROAD, HONOLULU, HAWAII 96816-4495

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8 OCT 1985  
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Cm Ops

ALEXIS T. LUM  
MAJOR GENERAL  
ADJUTANT GENERAL  
DAMES & MOORE  
PAUL H. NAKAMURA  
COLONEL (P)  
DEPUTY ADJUTANT GENERAL

HIENG

OCT 2 1985

Mr. John P. Whalen, Director  
Department of Land Utilization, C&C Hnl.  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Proposed Ewa Marina Community Increment II  
Ewa, Oahu

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer this time regarding this project.

Yours truly,

*Jerry M. Matsuda*  
Jerry M. Matsuda  
Major, Hawaii Air  
National Guard  
Contr & Engr Officer

Enclosure

cc: Dames & Moore

Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

October 25, 1985

State of Hawaii  
Department of Defense  
Office of the Adjutant General  
3949 Diamond Head Road  
Honolulu, Hawaii 96816-4495

Attention: Major Jerry M. Matsuda  
Hawaii Air National Guard  
Contr & Engr Officer

Dear Major Matsuda:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 2, 1985, and understand that you have no comments.

Yours very truly,

DAMES & MOORE

*Jennifer J. Kleveno*  
Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B(4):13822-001-11)



GEORGE R. ARYOSH  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF EDUCATION  
P. O. BOX 2360  
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

October 4, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 S. King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

SUBJECT: Zone Change Application - Ewa Marina  
TMK: 9-1-12: 7-17, Por. 2,5, & 6

Our review of the Ewa Marina (Increment II) development indicates that the proposed 3,449 housing units will generate the following student enrollment:

SCHOOLS	GRADES	APPROXIMATE ENROLLMENT
Ewa Beach, Pohakea, & Kamiloa Elementary	K-6	270 - 500
Ilima Intermediate	7-8	70 - 120
Campbell High	9-12	130 - 240

The combined capacity of the three elementary schools listed can accommodate the projected enrollment subject to an adjustment in the existing service areas.

The secondary schools can accommodate the projected enrollment increase. We would appreciate being kept informed of the progress of the development so adjustments in the service areas can be made in a timely manner.

Thank you for the opportunity to review the application.

Sincerely,

Francis M. Hatanaka  
Superintendent

FMI:j1 (HL)

cc V. Honda, ORS  
W. Araki, Leeward Dist  
✓Dames & Moore

AN EQUAL OPPORTUNITY EMPLOYER

FRANCIS M. HATANAKA  
SUPERINTENDENT

D-4

Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3583  
Cable address: DAMEMORE

October 28, 1985

Mr. Francis M. Hatanaka  
Superintendent  
State of Hawaii  
Department of Education  
P. O. Box 2360  
Honolulu, Hawaii 96804

Dear Mr. Hatanaka:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 4, 1985, and will be including your comments in the Final EIS.

We will also keep you informed of the development's progress as you requested.

Yours very truly,

DAMES & MOORE

  
Jennifer J. Kieven  
Assistant Environmental Scientist

JJK:ob(2446A/129B(5):13822-001-11)

GEORGE R. ARIYOSHI  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
P. O. BOX 3376  
HONOLULU, HAWAII 96801

October 22, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City & County of Honolulu  
650 S. King St.  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Zoning Change and  
Draft Environmental Impact Statement  
Ewa Marine, Increment II, TMK 9-1-12: 7-17, Por. 2, 5 & 6

#### ZONE CHANGE COMMENTS

##### Drinking Water

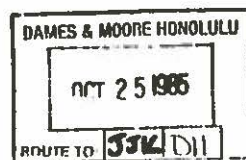
The re-zoning application document discusses several alternatives for providing potable water to the subject development. The report suggests the use of a dual water system, whereby potable water use requirements will be augmented or supplanted by nonpotable water for certain uses within the development.

The Department of Health wishes to restate that the use of a dual water system shall be restricted. Nonpotable water shall be used only for irrigation of highway landscaping, irrigation of golf courses and large common lawn areas maintained by the association. The use of a dual water system within individual households shall not be allowed.

The Department of Health has some reservation over the construction of a marina. Excavations into the caprock formations can have significant adverse effects on the caprock water resources. Excavations would create a pathway for basal and caprock water to leak into the coastal waters.

##### Noise

There are reservations in the proposed zone change due to noncompatible use of land. Noise associated with agricultural, recreational and commercial activities may adversely affect residential areas. Aircraft noise will also have an adverse impact on residents of this project.



LESLIE S. MATSUBARA  
DIRECTOR OF HEALTH

In reply, please refer to  
EPHSD

Mr. John P. Whalen  
October 22, 1985  
Page 2

#### DRAFT EIS COMMENTS

##### Drinking Water

The Drinking Water Program would like to express its concerns over the proposed use of a dual water system to meet the water supply needs of the proposed development. Use of a nonpotable system shall be strictly restricted to highway irrigation, golf courses, and large common lawn area maintained by an association. Further, the owner of the water system shall maintain a surveillance and monitoring program for contaminants that may enter the system. Steps must be taken to assure that there will be absolutely no possibility that cross-connections can be made between the two systems. The dual systems must be designed to prevent the possibility of water from either system entering the other system. It should also be mentioned that the withdrawal of brackish water from the Pearl Harbor Groundwater Control Area is similarly controlled by the Department of Land and Natural Resources.

##### Noise

The applicant has discussed noise impacts from construction, vehicular traffic, power boats, aircraft and recreational activities. The applicant has also indicated separation of land uses within the community to minimize noise impacts.

The following comments should be added:

1. Public Health Regulations, Chapter 44B has been repealed; reference should be directed towards Title II, Administrative Rules.
2. Through facility design, noise from equipment such as air conditioning/ventilation units, generators, compressors, pumps and exhaust fans must be attenuated to meet the allowable noise levels of Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu.
3. Activities associated with the construction phase must comply with the provisions of the regulations.
  - a. A noise permit must be obtained if the noise levels from the construction activities are expected to exceed the allowable noise levels of the regulations.
  - b. Construction equipment and on-site vehicles or devices requiring an exhaust of gas or air must have a muffler.
  - c. The conditional use of the permit must be complied with as specified in the regulations and the conditions issued with the permit.



Mr. John P. Whalen  
October 22, 1985  
Page 3

4. Traffic noise from heavy vehicles traveling to and from the construction site must be minimized in residential areas and must comply with the provisions of Title II, Administrative Rules Chapter 42, Vehicular Noise Control for Oahu.

#### Air Pollution

The EIS should address the potential impact of traffic-related emissions.

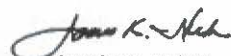
#### Wastewater Treatment

The EIS should address the cost required to expand the Honouliuli Wastewater Treatment Plant (WWTP). The plans for modification of the sewage outfall must be reviewed by the DCH's Wastewater Treatment Works Construction Grants Branch (WWTCG).

The EIS should also address the impact of odors from the Honouliuli WWTP.

The WWTCG Branch wishes to have a clarification of how or where the 11 mgd number (pages 4-10) was derived. This number indicates the flow capacity projection to accommodate future developments between Makakilo and Halawa. Please contact Mr. Dennis Tulang, Chief, WWTCG Branch with the response at 548-4127.

Sincerely yours,



JAMES K. IKEDA  
Deputy Director for  
Environmental Health

cc: Dames & Moore (Attn: Jennifer J. Kleveno)

## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 733-3383  
Cable address: DAMEMORE

December 4, 1985

Mr. James K. Ikeda  
Deputy Director for Environmental Health  
State of Hawaii  
Department of Health  
P. O. Box 3378  
Honolulu, Hawaii 96801

D11

Dear Mr. Ikeda:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 22, 1985 and offer the following response to your comments.

#### Drinking Water

The water master plans for the Ewa Marina Community have been approved by the Board of Water Supply. As stated in the Draft EIS, the non-potable water will be used for irrigation and non-domestic use. The appropriate design steps (for example color coded pipes) will be taken to assure that cross-connections cannot be made between the potable and non-potable systems. The developer will apply for the appropriate permits from the Department of Land and Natural Resources for the withdrawal of brackish water.

#### Noise

1. Reference has been directed towards Title II, Administrative Rules instead of Chapter 44B.
2. The following paragraph has been added to Section 6.1.5, Acoustical Impacts:

"Through facility design, noise from equipment such as air conditioning/ventilation units, generators, compressors, pumps, and exhaust fans will be attenuated to meet the allowable noise levels of Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu."

- 3 & 4: A noise permit will be obtained if necessary and construction equipment and on-site vehicles will have exhaust mufflers. These requirements were not stated specifically in the EIS due to the preliminary nature of the document but are assumed to be included in the following sentence: "All construction activities must conform to the provisions of Title II, Administrative Rules Chapter 43, Community Noise Control for Oahu ...." This sentence has been expanded to include Chapter 42, Vehicular Noise Control for Oahu.

## Dames & Moore



State of Hawaii  
Department of Health  
December 4, 1985  
Page 2

### Air Pollution

Traffic related emissions are discussed in Section 6.1.3. Air Quality impacts.

### Wastewater Treatment

Honouliuli Wastewater Treatment Plant (WWTP) expansion was not discussed in the EIS for the following reasons:

1. Present average daily flow at the Honouliuli WWTP is 17 mgd (personal communication, operations personnel, Honouliuli WWTP), and existing capacity is 25 mgd. Average daily flow anticipated from the Ewa Marina Community Increment II is 1.761 mgd. Addition of this flow to the present average daily flow will not require expansion of the WWTP.
2. The sewer master plan for the Ewa Marina Community Increment II has been approved by the City and County of Honolulu, Department of Public Works Wastewater Management Division.

Plans for modification of the sewage outfall will be coordinated with the Department of Public Works, Wastewater Management Division and with the Department of Health, Wastewater Treatment Works Construction Grants Branch.

Section 6.1.3., Air Quality Impacts has been expanded to include the impact of odors from the Honouliuli WWTP.

Yours very truly,

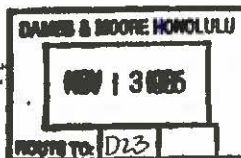
DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)



GEORGE R. ARIYOSHI  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
P. O. BOX 621  
HONOLULU, HAWAII 96808

REF. NO.: CPO-1919-85

NOV 13 1985

Honorable John Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

SUBJECT: Comments on Draft Environmental Impact Statement for  
Increment II of the Proposed Ewa Marina Community at  
Ewa, Oahu, Hawaii

We have reviewed the subject document and have the following  
comments:

Our Land Management Division's concerns on the pre-draft EIS  
stage (see attached letter of December 7, 1984) related to land  
rights for the proposed channel entrance and jetties. The consul-  
tant, Dames and Moore, indicated by its response of February 11,  
1985 that the "EIS has been revised to address these issues."

The draft EIS states that "the developer is working out details  
with the State of Hawaii for establishing land rights for the por-  
tions of the marine entrance channel and breakwaters located on or  
using State lands." We did meet for the pre-draft EIS but we have  
not been contacted nor have we received application on the issue of  
land rights and liability, and maintenance responsibility of the  
entrance channel and jetties.

The draft EIS should contain a statement that the owner of the  
project will be responsible for maintenance and the safety of the  
groins (jetties) and channel.

In our previous comments on a pre-draft EIS for the proposed Ewa  
Marina Community, Increment II, our concerns also included the need  
for adequate assessment of biological impacts of the proposed  
channel entrance, public access to the proposed marina and boat  
launch facilities, and appropriate compensation for exclusive use of  
submerged public lands (under proposed breakwaters and spoils  
removed from the proposed channel). The DEIS indicates public  
accessibility would be provided to the proposed marina and boat  
launch facilities, and the developer will negotiate compensation for  
use of public lands with the State.

SUSUMU ONO, CHAIRMAN  
BOARD OF LAND & NATURAL RESOURCES  
EDGAR A. HAMASU  
DEPUTY TO THE CHAIRMAN

DIVISIONS:  
AQUACULTURE DEVELOPMENT  
PROGRAM  
AQUATIC RESOURCES  
CONSERVATION AND  
RESOURCES ENFORCEMENT  
CONVEYANCES  
FORESTRY AND WILDLIFE  
LAND MANAGEMENT  
STATE PARKS  
WATER AND LAND DEVELOPMENT

John Whalen  
C&C, DLU

CPO-1919-85  
NOV 13 1985

A letter from the applicant's consultant to the Department (see  
attached letter of February 11, 1985) promised "during the soils  
investigation for the channel, additional photographs will be taken  
and forwarded to the office. This information will be included in  
the draft EIS." Our copy of the EIS contains neither photo-documen-  
tation nor written description of the marine benthic habitat spec-  
ific to the proposed alignment.

The DEIS discusses four alternate channel entrance alignments.  
In the applicant's assessment, alternate 3 would not adversely  
affect recreational value of Oneula Beach Park and would reduce  
adverse impacts to the existing surfing site. This alternative  
would be preferable to the proposed alignment since the south shore-  
line between Sand Island and Barbers Point has few popular acces-  
sible surfing sites.

The DEIS states that "sand would be removed and put on the down-  
drift side of the channel" during routine maintenance (p. 4-8).  
Sand which would accumulate in the channel entrance as a result of  
littoral drift is owned by the State and its disposition should be  
determined by the DLNR.

Previous suggestions regarding marina excavation (no blasting  
from November through May to minimize impacts adverse to Hawaiian  
humpback whale, pre-blast visual inspection for marine mammals and  
sea turtles, transfer of dredged channel spoils directly from barge  
scows onto dry land rather than redepositing spoils in water) remain  
applicable.

As noted in past project reviews, the proposed Ewa Marina  
Community is located in the Pearl Harbor Ground Water Control Area.  
As such, any modifications of present ground water use and all wells  
proposed to be developed in this area require appropriate permits  
and approval of the Board of Land and Natural Resources.

Existing water development, projected Ewa Marina Community water  
requirements and supply options are discussed. We note that option  
"b" on page 4-11 indicates that 22 million gallons per day (mgd)  
from the Pearl Harbor Ground Control Area could be reallocated by  
DLNR to the Board of Water Supply or directly to other users within  
the Ewa Plain.

On July 11, 1985, the Board of Land and Natural Resources did,  
in fact, reallocate 11.81 mgd from the Pearl Harbor Ground Water  
Control Area to the City and County of Honolulu, Board of Water



John Whalen  
C&C, DLU

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NOV 13 1985

Supply for distribution among various Ewa/Pearl Harbor developments including the Ewa Marina Community. Under this reallocation, Ewa Marina has been allotted 1.048 mgd for a projected six-year growth period. This amount is to be supplied from existing as well as new well sources.

On pages 6-14, paragraph 6.4.2, water supply, the potable water demand is projected to be 2.39 mgd. This would indicate a projected shortage of approximately 1.3 mgd. The final EIS should, therefore, address this projected water shortage and discuss the alternatives in providing for this shortage.

Oahu Sugar Company withdraws brackish water for irrigation from a limestone caprock aquifer from a number of wells located near the proposed marina. The impact of the proposed marina on the caprock aquifer is mentioned under Hydrological Impacts (pg. 6-2); however, the full extent of the potential problem is not clearly stated.

The proposed marina and internal waterways will require major excavations in the limestone aquifer to a depth of 8 to 12 feet below sea level and approximately 0.9 mile inland. This will allow the salt water marine environment to extensively invade and destroy the brackish groundwater aquifer about 5,000 feet inland from the coastline.

It should be noted that the groundwater underlying the proposed marina/waterway area is only slightly brackish, ranging from 1,000 ppm near the shore to 600 ppm (3% of sea water salinity) inland and is, therefore, a useable resource. Also, the sea water intrusion that will result from the proposed marina may destroy or adversely affect the usefulness of Oahu Sugar Company's brackish groundwater sources; namely, EP 20, 21, 22, 24 and EP 27A, 27B, 28 and 29 in this area. Oahu Sugar Company should be consulted in this matter and a full discussion of the salt water intrusion problem provided in the final EIS.

A review of our records indicates that this project does not occur on historic properties are listed on the Hawaii Register or the National Register of Historic Places, or that have been determined eligible for inclusion on the National Register of Historic Places. The proposed development does occur within the boundaries of the Oneula Archaeological District, a site which may be eligible for inclusion on the National Register of Historic places.

Our review of the subject EIS and the archaeological reconnaissance of the subject area (Reconnaissance and Evaluation of Archaeological Sites in the Proposed Ewa Marina Community, Ewa, Oahu,

John Whalen  
C&C, DLU

CPO-1919-85  
NOV 13 1985

Hawaii", Hammatt, 1984) has resulted in our concurrence with the recommendations of the consulting archaeologist who states that further research should be conducted on the features to be impacted by the development and this further research should involve the following (Hammatt, 1984:7):

1. Systematic test excavations of selected sites which are determined to be prehistoric or early historic.
2. Excavation of significant sites determined on the basis of the test results.
3. This research should involve dating of volcanic glass and charcoal as well as identification of midden material, particularly fossil bird bone.

We further recommend that two copies of this mitigative action, including a comprehensive base map be submitted to our office for review in a timely manner, so that any further recommendations for mitigation from our office can be completed by the developer and/or his consultant prior to the start of any construction activity for the proposed project.

Sinkholes exposed during land clearing and grading should be evaluated by an archaeologist and minimally 50% of sinkholes larger than one meter in diameter should be surveyed, mapped, and test pitted. Where fossil remains are found in these sinkholes, they should be excavated archaeologically. All other sinkholes may be generally shown as appropriate areas. Two copies of the monitoring report should also be submitted to our office for review and comment in a timely manner.

Finally, we recommend that all of the above mitigative activities be specifically stated in the final EIS.

The agency coordinating our department's response under the Chairperson's signature should add "State Historic Preservation Officer" to this title as Chairperson when the undertaking has any federal involvement including responses to a federal agency, A-95 responses, or involving federal funding, loan guarantee, permit or license.

The anticipated permitting schedule on page 1-3 of the EIS needs to be clarified. A 90-day extension can only be requested if a contested case hearing is held or an EIS is prepared during the 180-day CDUA processing time. Furthermore, it seems that the proposed development schedule (Fig. 4-4) contradicts the anticipating permitting schedule.



John Whalen  
C&C, DLU

CPO-1919-85  
NOV 13 1985

Finally, a Conservation District Use Application (CDUA) will be required for all activities occurring in the conservation district. We understand that the final EIS, if accepted by your department, will be used in the filing of the required CDUA for the project. Therefore, be advised that in order for the final EIS to be submitted with the Conservation District Use Application, the EIS must cover all activities that will occur in the conservation district, and the concerns that we have raised on this draft document must be adequately addressed in the final EIS.

We appreciate the opportunity to comment. Should you have any questions, please feel free to contact our Planning Office staff at 548-7837.

Very truly yours,

  
SUSUMU ONO, Chairperson  
Board of Land and Natural Resources

cc: Office of Environmental Quality Control

DEC 7 1985

REF. NO.: CPO-1149-85

Ms. Jennifer Kleveno  
Danes and Moore  
1144 Tenth Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

SUBJECT: Comments on the Pre-Draft EIS for the Proposed  
Ewa Marina Community, Increment II at Ewa, Oahu, Hawaii

We have reviewed the subject document and have the following comments:

As we have expressed our concerns on Increment I of the subject project, we want to emphasize those concerns in regard to the management and protection of the groundwater resources within the Pearl Harbor Ground Water Control Area. Since the project is within the Pearl Harbor Ground Water Control Area, the subject EIS should further address the issue of the water supply sources for the project as it is affected by the Pearl Harbor Ground Water Control Area. Appropriate permits and approval from DLNR are required if the plans for the project call for development of ground water within the Pearl Harbor Ground Water Control Area.

We also have concerns relating to the proposed jetties and the channel dredging to the sea. We need to know what kind of land rights will be obtained for the jetties and the channel area. Also, who will be responsible for maintenance and liable for public safety of the areas. These concerns should be addressed in the EIS.

Our primary interest from the wildlife standpoint is the wetland area of approximately nine acres, especially if there is a natural fresh water source. As stated in this pre-draft EIS, although the endangered Hawaiian Stilt, Coot and Gallinule are not reported seen in this area, it could be developed and become attractive to waterbirds. A positive step by the developers was to classify the wetland area and additional surrounding area into a 27.50 acre preservation area. Although this pre-draft does not discuss the purpose of the preservation classification, we request that this designation mean no vehicular disturbance except for maintenance purposes and only passive human activities. We anticipate its discussion in the environmental impact statement. It appears that our other concerns - fire protection, emergency services, public access to the beach areas, and other fauna and flora - will also be addressed in the environmental impact statement.

Board of Land and Natural  
Resources

CPO-1149-85

The information regarding archaeological sites in the project area should be considered preliminary. A comprehensive, intensive archaeological survey needs to be conducted in the project area. Federal law requires that all sites in the project area be located and evaluated as early as possible in the planning phase of a proposed undertaking.

The entire project area is part of State Site No. 50-0A-2073, the One'ula Archaeological District. This is not mentioned in the pre-draft EIS. A map showing the areaded boundaries of the archaeological site needs to be sent to the National Register of Historic Places, along with photographs (no smaller than 5"x7") of representative visible structural remains. Similar documentation should be sent to the State Historic Preservation Office. A determination of eligibility is required by federal regulations.

A preliminary case report should also be submitted to the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for review and comment, as outlined in 36 CFR 800.

All archaeological work for the project should be coordinated with the staff of the Historic Sites Section in DLNR. Very little coordination or consultation has occurred in the past. Scope-of-work, research designs, field work and reports should be submitted to Historic Sites. Regarding the 1984 reconnaissance survey conducted for this pre-draft EIS, no consultation occurred and no report has been sent to the SHPO.

The plans for site preservation also are inadequate. More sites need to be preserved. Specific recommendations cannot be made by our office until a complete survey is done and we have the opportunity to make a field inspection of the sites in the project area. No site should be destroyed without proper study. The plans for preservation need to take into account the public use potential of the sites.

If construction approval is granted, the EIS should also state that:

In the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls are encountered during construction, the applicant shall stop work and contact the Historic Preservation Office at 548-7400 or 548-6408.

Board of Land and Natural  
Resources

CPO-1149-85

With respect to construction in the marine waters, we suggest that the marina excavation should begin at the inland end and proceed towards the sea; a berm should be left intact as long as possible to separate the area of excavation from the sea. Blasting in waters open to the sea should be limited to intervals between June and October, to minimize potential for impact adverse to Hawaiian humpback whales. Prior to detonations underwater, the blast area should be inspected visually for marine mammals and sea turtles (of which all Hawaiian species are threatened or endangered); detonations must be postponed until these animals have reached distances safe from blast effects.

When dredged spoils from the channel are barged to stockpiles on fast land, the inevitable effects of turbidity would be minimized if spoils are not redeposited in the water (e.g. a crane could transfer spoils directly from the barge onto dry land). If for any reason spoils are dumped back into the water in a basin open to the sea (as is being done at the Barbers Point harbor), silt curtains must be used to reduce the volume of resuspended sediments flushing into the sea.

In addition, although several studies were performed for and cited in the pre-draft EIS, only three surveys partially covered areas over the proposed channel area. The marine biological studies cited in this pre-draft EIS fail to document the marine resource values of the proposed channel area thoroughly and to assess the potential impacts comprehensively. Boat launch facilities, if proposed, and their availability to the non-resident public should also be discussed since mention of boat ramps was made at a scoping meeting on July 12, 1984.

We note on page 5-2 of the pre-draft EIS that "the dredged material would be used for core material in jetty construction and for fill in the residential area." There is no mention of compensation, if any, to the State for this material.

With respect to the Section on "Project and Environmental Assessment Process", we would like to clarify that, although DLU will act as the lead agency in processing the EIS, we will require a revised EIS for the project during the CDMA process, should the Final EIS, accepted by DLU, not adequately address our concerns. Furthermore, there appears to be some inconsistency in the anticipated schedule for processing the CDMA. The submission date is left open yet the



Board of Land and Natural  
Resources

CPO-1149-85

acceptance date is stated as November 7, 1985. Also, we fail to see why the EIS required notification date is listed as December 22, 1985. We suggest that if a proposed schedule for the CDOA process will be made a part of the EIS, the deadlines be consistent with the applicable regulations.

Thank you for allowing us the opportunity to comment. Should you have any questions, please feel free to contact our Planning Office staff at 548-7837.

*E. Mason Young*

SUSUMU ONO, Chairperson  
Board of Land and Natural  
Resources

BU:bq

FEB 13 1985

Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1583  
Cable address: DAMEMORE

February 11, 1985

FEB 13 9:50

STATE OF HAWAII  
NOP 6

State of Hawaii  
DEPARTMENT OF LAND & NATURAL RESOURCES  
P. O. Box 621  
Honolulu, Hawaii 96809

Attention: Mr. Susumu Ono

Dear Mr. Ono:

Response to Comments  
Pre-Draft EIS/Notice of Preparation  
Proposed Ewa Marina Community, Increment II  
Ewa, Oahu, Hawaii

We have received your letter of December 7, 1984, and offer the following responses to your comments.

The Draft EIS will state that the project is within the Pearl Harbor Ground Water Control Area. We understand that DLNR has certified a reduction of about 22 mgd in allocation of water to Oahu Sugar. DLNR could re-allocate this amount to the Board of Water Supply or Campbell Estate for future development. This also will be indicated within the Draft EIS among other water development scenarios.

Based upon our February 5, 1985 meeting with Mr. Mason Young of the Land Management Division of DLNR, we understand that the applicant will have to obtain land rights from the State of Hawaii for the groins and channel areas. The State also will have to be reimbursed for the material removed from the channel area and used by the applicant.

The owner will be responsible for maintenance and the safety of the groins and entrance channel. The EIS has been revised to address these issues.

The preservation classification within the project is intended to maintain this area in its present state. Automobile access will be prohibited. However, public access over existing trails will continue. The wetland is brackish and does not contain a natural fresh water source. The Draft EIS will reflect these clarifications.

Roger \_\_\_\_\_ Post \_\_\_\_\_  
Aki \_\_\_\_\_ Library \_\_\_\_\_  
Anne \_\_\_\_\_ Maude \_\_\_\_\_  
Dean \_\_\_\_\_ Barbara \_\_\_\_\_  
File in \_\_\_\_\_  
To Carol For \_\_\_\_\_

## Dames & Moore

State of Hawaii - DLNR  
February 11, 1985  
Page 2

The State Historic Preservation Officer has designated a portion of the project area as the One'ula Archaeological District, State Site No. 50-0A-2873. This statement and a map showing the amended boundaries will be included in the Draft EIS. The Keeper of the National Register has requested additional documentation from the Corps of Engineers to determine eligibility of the designated sites for inclusion in the National Register of Historic Places.

A copy of the 1984 reconnaissance survey conducted for the pre-draft EIS has been sent to the State Archaeologist, Mr. Earl Neller.

We discussed with Mr. Earl Neller on January 21, 1985 his concerns for preservation of archaeological sites and public access to these sites. Plans for site preservation and any additional archaeological surveys required for the project are being coordinated with Mr. Neller and the archaeologist for the project. The Draft EIS will address potential plans for site preservation and will include the following paragraph:

... in the event any unanticipated sites or remains such as shell, bone or charcoal deposits, human burials, rock or coral alignments, pavings, or walls are encountered during construction, the applicant will stop work and contact the Historic Preservation Office at 548-7460 or 548-6408.

Concerning construction in marine waters, the Draft EIS will clarify that the entrance to the ocean will not be opened until marina excavation is completed, and that turbidity will be minimized during channel dredging by the transfer of spoils directly onto dry land or by the use of silt curtains. The Draft EIS will also state that if blasting in waters open to the sea should be necessary, the U.S. National Oceanic and Atmospheric Administration, and DLNR will be consulted to minimize the potential for adverse impact to marine mammals. In addition, the blast area will be inspected visually for marine mammals and sea turtles prior to underwater detonations.

The marine biology studies and photographs developed in the field studies for the pre-draft EIS will be forwarded to the Aquatic Resource Section of DLNR to assess the documentation of marine resources. During the soils investigation for the channel, additional photographs will be taken and forwarded to the office. This information will be included in the Draft EIS.

Boat launch facilities will be available to residents and non-residents of the Ewa Marina Community on an equal basis. The Draft EIS will discuss their availability.

## Dames & Moore

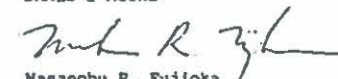
State of Hawaii - DLNR  
February 11, 1985  
Page 3

The CDUA processing schedule that appears in the pre-draft EIS has been revised to indicate the appropriate time periods for agency review of the EIS. In addition, the roles of DLW and DLNR in the permitting process will be clarified in the Draft EIS.

If you have any questions, please contact us.

Yours very truly,

DAMES & MOORE

  
Masanobu R. Fujioka  
Associate

HRF:JJK:ob(1610A/211A:13827-001-11)

CC: MSM & Associates  
Attention: Mr. Roy Cox



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3581  
Cable address: DAMEMORE

December 4, 1985

State of Hawaii  
Department of Land and Natural Resources  
P. O. Box 621  
Honolulu, Hawaii 96809

D23

Attention: Mr. Susumu Ono  
Chairman

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Ono:

Thank you for reviewing the Draft EIS. We have received your letter of November 13, 1985 and offer the following response to your comments.

The developer realizes that land rights and compensation for use of submerged public lands must be negotiated with your department. The developer will initiate negotiations and submit the appropriate applications.

Section 4.2.3 of the Draft EIS contains the following sentence:

"Maintenance of the breakwater to continue their protective function in a safe manner would be the responsibility of the developer." The sentence has been adjusted to include the entrance channel.

Repeated attempts to obtain additional photos of the marine benthic habitat specific to the proposed alignment have been thwarted by murky water conditions. Photos taken in the 1984 study, copies of which were forwarded to your department, and review of other environmental reports indicate that our original investigation is representative of the benthic area at the site and that the impacts on marine benthic communities along any alignment would be similar.

The developer realizes that sand which may accumulate in the entrance channel is owned by the State. Determination of the disposition of the sand will be coordinated with DLNR.

The developer will apply for the appropriate permits for all wells proposed within the Ewa Marina Community.

**Dames & Moore**

State of Hawaii  
Department of Land and Natural Resources  
December 4, 1985  
Page 2

The following paragraph appears in the Final EIS:

"On July 11, 1985, the Board of Land and Natural Resources did, in fact, reallocate 11.81 mgd from the Pearl Harbor Ground Water Control Area to the BWS for distribution among various Ewa/Pearl Harbor developments including the Ewa Marina Community. The BWS was allocated a permitted use of 2.0 mgd to drill new wells at Honouliuli. The source will be used for the Ewa Plain developments. The BWS is presently working with Campbell Estate to drill additional wells in the Honouliuli area for the proposed development."

After discussions with Edwin Sakoda, Division of Water and Land Development, it was decided to use the BWS figure of 2.0 mgd for new Honouliuli wells instead of the figure of 1.048 mgd allotted specifically to Ewa Marina as mentioned in your letter. This decision was made in order to eliminate confusion.

The projected water demand for the Ewa Marina Community has been recalculated to 1.723 mgd. The Final EIS addresses the topic of projected water shortages and discusses alternatives in providing for shortages.

A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II. Oahu Sugar Company is currently being consulted in reference to this study.

The section on Groundwater Hydrology has been adjusted to read as follows: Construction of the marina would have the effect of moving the shoreline approximately 5,000 feet inland, thus increasing salinities in the limestone aquifer.

Further research will be conducted on the archaeological features to be impacted. Based on your recommendations, the following program has been developed and will be specifically stated in the Final EIS.

Two copies of an Archaeological Mitigation Plan, including a comprehensive base map will be submitted to the Department of Land and Natural Resources (DLNR) in a timely manner, so that any further recommendations for mitigation from DLNR can be completed by the developer and/or his consultant prior to the start of any construction activity for the proposed project.

Further research will involve the following:

1. Systematic test excavations of selected sites which are determined to be prehistoric or early historic.

State of Hawaii  
Department of Land and Natural Resources  
December 4, 1985  
Page 3

**Dames & Moore**  


2. Excavation of significant sites determined on the basis of the test results.
3. Dating of volcanic glass and charcoal as well as identification of midden material, particularly fossil bird bones.

In keeping with DLNR recommendations, sinkholes exposed during land clearing and grading will be excavated by an archaeologist, and minimally, 50 percent of sinkholes larger than one meter in diameter will be surveyed, mapped, and test pitted. Where fossil remains are found in these sinkholes, they will be excavated archaeologically. Two copies of the monitoring report will be submitted to DLNR for review and comment in a timely manner.

The 90-day extension alternative has been deleted from the anticipated permitting schedule and the proposed development schedule (Figure 4-4) has been revised.

Yours very truly,

DAMES & MOORE



Jennifer J. Kleveno  
Assistant Environmental Scientist

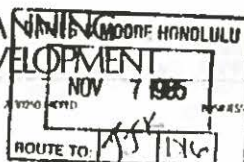
JJK:ob(2446A/129B:13822-001-11)





DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAHAMANI BUILDING, 750 SOUTH KING STREET, HONOLULU, HAWAII  
HAWAIIAN ADDRESS: P.O. BOX 2350, HONOLULU, HAWAII 96813



GEORGE B. ARYOSHI  
GOVERNOR  
KENT M. KEITH  
COMPTROLLER  
MURRAY E. YOWELL  
DEPUTY DIRECTOR  
LINDA KAPUNIAI ROSENWALD  
DEPUTY DIRECTOR

DIVISIONS  
PLANNING AND ECONOMIC DEVELOPMENT DIVISION  
LAND USE DIVISION  
LAND ACQUISITION DIVISION  
LAND TRAFFIC DIVISION  
LAND USE DIVISION  
LAND ACQUISITION DIVISION  
LAND TRAFFIC DIVISION  
RESEARCH AND ECONOMIC ANALYSIS DIVISION  
OFFICE  
ADMINISTRATIVE SERVICES OFFICE  
INFORMATION OFFICE

Ref. No. P-2990

November 5, 1985

The Honorable John P. Whalen  
Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: DEIS for Proposed Ewa Marina Community  
Increment II, Oahu

We have reviewed the subject draft environmental impact statement (DEIS) and offer the following comments with regard to the objectives and policies of the Hawaii Coastal Zone Management Program.

**Historic Resources:** Protect, preserve and where desirable restore those natural and man-made historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture (Chapter 205A-2(b)(2)(A), HRS).

The coastal portion of proposed Increment II of the subject, including the marina, commercial, and residential parcels, are within the Oneula Archaeological District. DEIS lists nearly 40 sites within this State-designated district. While historic sites are heavily concentrated in the area proposed for preservation, there are other sites in other areas of the project which may be significant and which may be disturbed or destroyed. Further survey and assessment of this should be conducted and reported in the final EIS. Also, the relationship of the area designated as preservation to future historic research and preservation, as part of the Oneula Archaeological District, should be further delineated in coordination with the State Historic Preservation Officer.

**Recreational Resources:** Protect coastal resources uniquely suited for recreational activities that cannot be provided in other areas, and require replacement of coastal resources having significant recreational value, including but not limited to surfing sites and sandy beaches (Chapter 205A-2(c)(1)(B)(i) and (ii), HRS).

The Honorable John P. Whalen  
Page 2  
November 5, 1985

We find the assessment regarding the loss of the "sand tracks" surfing site inadequate in terms of the site's popularity, frequency of use, quality of existing surfing conditions in comparison to other nearby surfing sites. There also appears to be insufficient basis for the assertion that new surf sites will be created from the new marina channel and breakwater. Figure 6-2, for example, suggests that these distinct surfing sites will be created by the alteration of the existing "sand-tracks" site. This assertion should be elaborated on.

Finally, as compensation for the loss or alteration of the existing surfing site, consideration should be given to access and use of a portion of the preservation area for surfers using "coves" and "johns" surfing sites.

Thank you for the opportunity to review and comment on this subject document.

Very truly yours,

*Kent M. Keith*

Kent M. Keith

cc: ✓ Ms. Jennifer J. Kleveno,  
Dames and Moore  
Office of Environmental Quality Control

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

State of Hawaii  
Department of Planning and Economic Development  
P. O. Box 2359  
Honolulu, Hawaii 96804

D16

Attention: Mr. Kent M. Keith  
Director

Dear Mr. Keith:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of November 5, 1985 and offer the following response to your comments.

Historic Resources:

During development of the Draft EIS numerous discussions took place and field trips were conducted with the State Historic Preservation Officer to evaluate the significance of sites that may be disturbed or destroyed in the development process. Coordination with the State Historic Preservation Officer will continue. Enclosed are copies of the latest correspondence.

Recreational Resources:

Figure 6-2 shows existing surf sites 1, 2, and 3 as identified using engineering applications (Walker, 1972). These are not new sites resulting from the installation of the channel and breakwaters. The title of Figure 6-2 has been changed to avoid misinterpretation. Using Walker's method\*, only certain areas of the Sand Tracks site were identified as surfing sites.

\* Walker, J. R. Recreational Surf Parameters, University of Hawaii, TR 73-30, 1972.

**Dames & Moore**

State of Hawaii DPED  
December 4, 1985  
Page 2

We have discussed the loss of Sand Tracks with members of the surfing community in terms of the site's popularity, frequency of use, and quality of existing surfing conditions in comparison with other nearby sites (personal communication, John Kelly, June 1984). It appears that under varying wind and wave conditions, these qualities change among the various surfing sites. Since a site's popularity increases with favorable conditions and decreases with unfavorable conditions, a quantitative measurement of popularity in comparison to other sites is difficult to obtain.

Access to the "coves" and "johns" surfing sites will be provided along the shoreline and through the preservation area.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleven  
Assistant Environmental Scientist

JJK:ob(2446A/1298:13822-001-11)

Attachments: DLNR letter, 13 November 1985  
Dames & Moore letter, 4 December 1985



GEORGE R. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF SOCIAL SERVICES AND HOUSING

October 1, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Gentlemen:

Subject: Proposed Ewa Marina Community Increment  
II - Ewa, Oahu, Draft Environmental  
Impact Statement

The Hawaii Housing Authority has reviewed subject matter and has no comments to offer relative to the proposed action at this time.

Developer has committed a total of 10 per cent of the residential program or 485 units of the entire project (I and II) would be allocated for affordable housing. The details of residential development are to be established during the design of the project, in collaboration with City and County planners and public housing agencies.

The Authority would be interested in being included in establishing the details of the affordable housing requirement.

Thank you for the opportunity to comment.

Sincerely,

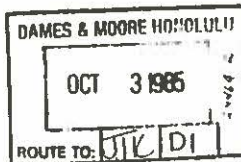
*Richard K. Paglinawan*  
for Franklin Y. K. Sunn  
Director

cc: ✓ Dames & Moore

FRANKLIN Y. K. SUNN  
DIRECTOR

RICHARD K. PAGLINAWAN  
DEPUTY DIRECTOR

ALFRED K. SUGA  
DEPUTY DIRECTOR



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

October 28, 1985

State of Hawaii  
Department of Social Services and Housing  
P. O. Box 339  
Honolulu, Hawaii 96809

Attention: Mr. Franklin Y. K. Sunn

Dear Mr. Sunn:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 1, 1985, and understand that you have no comments.

When an affordable housing application is submitted by the home builder, a copy will be forwarded to you for your coordination with the appropriate City & County of Honolulu agency.

Yours very truly,

DAMES & MOORE

*Jennifer J. Kieven*

Jennifer J. Kieven  
Assistant Environmental Scientist

JJK:ob(2446A/129B(2):13822-001-11)

GEORGE R. ARYOSH  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
808 PUNCHBOWL STREET  
HONOLULU 1, HAWAII 96813

November 8, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Rezoning Application and Draft EIS for Increment II,  
Ewa Marina Community, Ewa, Oahu

We have reviewed the subject matter and offer the following  
comments for your consideration:

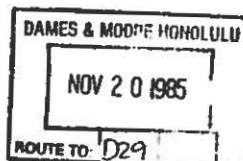
1. Maps presented in the DEIS (Figures 4-3,5,10,17 to 22, 5-1 to 8, 11) should clearly indicate the limits or boundaries of the Increment II area.
2. The developer should be informed that, based on previous trends, a large proportion of Ewa's future traffic will be headed towards Honolulu. Consequently, we agree with the developer's traffic consultant that the North-South Connector Road be aligned roughly parallel to Ft. Weaver Road and connect to a new interchange at Interstate Route 8-1. The new road and interchange shall be funded by the developer and/or the landowner.
3. Based on comment #2 and the project's proposal to "terminate" the North-South Connector Road at Renton Road, we believe that the northerly section of Fort Weaver Road and its Renton Road intersection will be seriously impacted. Since we find that this impact has not been previously evaluated, we feel it should be thoroughly discussed in the EIS before acceptance of the final document is recommended.
4. The project's traffic impact analysis report (TIAR) indicates that both roadway accesses to Fort Weaver Road will have double left-turn lanes on the assumption that the State highway will be widened beyond Hanakahi Street. It is probable that the widening will not occur prior to the construction of Increment II. Therefore,

WAYNE J. YAMASAKI  
DIRECTOR

DEPUTY DIRECTORS  
JONATHAN K. SHIMADA, PH.D.  
WALTER T.M. MO  
CHERYL D. SOOM  
ADAM D. VINCENT

IN REPLY REFER TO

STP 8.10929



Mr. John Whalen  
Page 2

STP 8.10929

the developer should be ready to implement improvements (widening from the vicinity of Road 8 to the vicinity of Hanakahi Street) along Fort Weaver Road to accommodate the anticipated traffic increases. We note that construction funds to widen this highway section have not been appropriated to date and without the improvements, the TIAR predicts that the facility will operate at a poor level of service. Furthermore, the TIAR states that intersection improvements will be implemented at Roads A and B along Fort Weaver Road, during the construction of Increment II. These intersection improvements include separate right-turn lanes on Fort Weaver Road for southbound traffic, separate left-turn lanes on Fort Weaver Road for northbound traffic, and signalization. All of these improvements shall be funded by the developer.

5. The TIAR indicates that left-turn lanes will also be necessary at Renton Road, Geiger Road and Papipi Road. In addition, the developer should thoroughly analyze the Fort Weaver Road/Hanakahi Street intersection and implement any needed improvement there at his cost.
6. Another unresolved issue concerns the proposed park which is located alongside Fort Weaver Road. As we have previously mentioned, the park should be located away from the highway in order to accommodate the Hanakahi Street intersection improvements and/or the widening of this facility.
7. We are currently discussing with Campbell Estate representatives the approximate timetable for the construction of the North-South Connector Road. Notwithstanding, it should be clearly established that all highway improvements required by the Ewa Marina Community development, including the North-South Connector Road and any required improvements along Ft. Weaver Road, shall be funded by the developer and/or landowner.
8. The developer and landowner should be informed that we are very concerned about the effects of large developments on the downstream sections of our highway system. Consequently, we are presently considering methods to obtain developer assistance in order to fund needed improvements.



Mr. John Whalen  
Page 3

STP 8.10929

## Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
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Cable address: DAMEMORE

December 4, 1985

9. It was our understanding that the developer, in consideration of the Airport Division's guideline that the 60 LDN contour should be the demarcation beyond which residential development should be discouraged, would incorporate a covenant for future homeowners and residents for properties within and in proximity to the areas impacted by aircraft noise exposures of 60 LDN or greater. In reviewing the subject documents, we find no such discussion or mention of such a covenant. We would appreciate information on the developer's intent and actions proposed regarding this matter.
10. In our earlier discussion with the developer, a public boat launching ramp facility was to be included in this development. We find statements only mention the 1600 slip marina with 1000 of these berths to be available to the general public. No mention is made for a boat launching facility. Our studies indicate the demand for such a facility in that area is very high. Further, drainage into the waterway area must be controlled to insure pollutants and debris are not introduced into the water.

Thank you for this opportunity to provide comments.

Very truly yours,

  
Wayne J. Yamasaki  
Director of Transportation

cc: ✓ Dames & Moore  
Attn: Jennifer J. Kleveno

State of Hawaii  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

D29

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Attention: Mr. Wayne J. Yamasaki  
Director

Dear Mr. Yamasaki:


Thank you for reviewing the Draft EIS. We have received your letter of November 8, 1985 and offer the following response to your comments.

1. The Figures have been modified to more clearly define the Increment II area. This area includes the entire outlined area except for the stippled portion designated Increment I.
2. - 9. The developer is currently working with the Department of Transportation Highways Division to adequately address and resolve the concerns discussed in comments 2. through 9.
10. Two boat launch facilities will be provided. Their locations within the marina will be shown in one of the figures in the Final EIS.

The storm drainage system will be designed in accordance with the City & County design standards and will include impact-type energy dissipation structures where storm drains enter the marina. In addition, a marina patrol will be employed to remove debris that may collect in the marina.

Yours very truly,

DAMES & MOORE

  
Jennifer J. Kleveno  
Assistant Environmental Scientist

GEORGE M. ARIYOSHI  
GOVERNOR



STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL  
550 HALEKUAHULA STREET  
ROOM 301  
HONOLULU, HAWAII 96813

October 15, 1985

Ms. Jennifer J. Kleveno  
Assistant Environmental Scientist  
Dames and Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

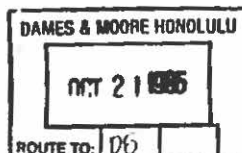
Dear Ms. Kleveno:

Subject: Comments to Ewa Marina Community, Increment II  
Draft EIS.

We have reviewed your draft EIS and offer the following  
comments for your consideration:

1. Surfing sites--It appears that the surf site known as sand tracks will be destroyed by the marina entrance channel according to figure 6-1, however, figure 6-2 shows the same location as being three separate surf sites. Please clarify this discrepancy.
2. Surfing sites--The creation of an artificial reef should be considered as a mitigating measure for the surfing site that will be lost.
3. Water supply--There are a number of developments being proposed in the leeward area, the largest being West Beach. These developments will be competing for the same potable water source as Ewa Marina. The availability of water should be discussed in this context. Additionally the capture of Waiau spring water, the 22 mgd reduction in consumption by Oahu Sugar, and drilling of wells at Makaha and Waianae will directly impact but are beyond the control of the applicant. The EIS should provide supporting evidence that these events will actually occur.

LETITIA N. UYEHARA  
DIRECTOR  
TELEPHONE NO.  
548-6915



Ms. J.J. Kleveno  
October 15, 1985  
Page 2

4. Noise--The western portion of the development already exceeds the Housing and Urban Development's noise standards of 65 db for new residential developments yet indications are that homes will be constructed in that area. The U.S. Navy AICUZ noise contours and Campbell Estate's noise study primarily considered aircraft noise and did not take into account future traffic and marina boat noise. This indicates that noise levels will be higher than that indicated in figure 5-7 or 5-8. The noise from these sources will cause a larger area to exceed HUD's noise standards.

Thank you for providing us the opportunity to review this  
EIS.

Sincerely,

Letitia N. Uyehara  
Director



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

State of Hawaii  
Office of Environmental Quality Control  
550 Halekauwila Street, Room 301  
Honolulu, Hawaii 96813

Attention: Ms. Lititia N. Uyehara  
Director

Dear Ms. Uyehara:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 15, 1985 and offer the following response to your comments.

1. As stated in Section 6.4.8 Recreation, under Surfing, Sand Tracks is one of the six surfing sites in the vicinity, as identified by the Department of Planning and Economic Development and by the Department of Land and Natural Resources, and as shown in Figure 6-1.

Surf sites were also identified by Moffatt & Nichol, Engineers using the method described by Walker (1972) "By studying the bathymetry, surfing sites 1, 2, and 3 were identified as shown in Figure 6-2. Using this method only certain areas of the Sand Tracks site were identified as surfing sites."

2. The creation of an artificial reef has been included in the Final EIS as a mitigating measure for the partial loss of Surfing Site no. 1.
3. Residential units will not be constructed in the areas exposed to over 65 db. After discussion of air craft noise, the other significant noise source in any urban area is motor vehicle traffic. Unlike aircraft noise, the noise exposure from motor vehicles is confined to relatively narrow corridors adjacent to the roadways. The noise from passenger cars is generated close to the surface and decreases with increasing distance from the roadway. This decrease in noise level is further affected by structural and terrain barriers adjacent to the roadway as well as excess attenuation produced by the ground surface. As a result, traffic noise is not a significant problem in the small neighborhood clusters planned for the Ewa Marina Community. The small neighborhood clusters are accessed by a single connector from local collective streets and there

State of Hawaii OEQC  
December 4, 1985  
Page 2

**Dames & Moore**

will be no through traffic in these neighborhoods. Internal neighborhood streets will experience minimum traffic and minimum noise from this source. The typical internal low density neighborhood in Ewa Marina Community should experience noise levels of approximately 50 db at typical building setback lines. [Refer to HUD Noise Assessment Guidelines, 1983]

Noise generated by automobile traffic along the major collector streets will be controlled by structural and terrain barriers (walls and berms) separating the residential neighborhoods from primary circulation.

Boat traffic noise is also local and can be minimized by structural and terrain barriers and by building orientation. Wet boat storage slips will average over 30 feet in length and consequently attract sailing and motor yachts with generally quiet sources of power. Speed limits will be set and strictly enforced resulting in minimum power requirements for boats underway.

Launching of high-powered trailored boats will be restricted to the non-residential areas. Boat maintenance will be restricted to commercial areas. Any noise from boat sources will be sporadic and primarily limited to the marina corridor.

The noise from these different sources is added or increased by combining noise energy. At those locations where the individual noises, i.e. air craft, motor vehicle or other sources, are sufficiently close to the same level to result in a major change in overall level, two noises of the same level will increase by a maximum of 3 db or 3 Ldn. Thus, a location exposed to 62.5 Ldn aircraft noise and 62.5 Ldn traffic noise experiences a total environmental noise exposure of 65.5 Ldn within the traffic corridor. If one of the noises is 3 Ldn below 62.5, the combined noise level is 64.3. The combined level is reduced to 62.8 Ldn as the difference between the two noises is 12 Ldn. The increase in combined sound level will occur only within a corridor close to the roadway where aircraft and traffic noise levels intersect.

The continuous environmental background noise in an urban area is determined by roadway noise. The Ldn value for aircraft noise comprises a series of isolated, short duration events. There is no documentation describing the overall response of people to the combined effects of these widely disparate types of noises.

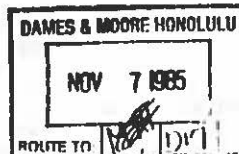
Yours very truly,

DAMES & MOORE

*Jennifer J. Kieven*  
Jennifer J. Kieven  
Assistant Environmental Scientist

DEPARTMENT OF GENERAL PLANNING  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813



DONALD A. ELEGG  
CHIEF PLANNING OFFICER  
GENE CONNELL  
DEPUTY CHIEF PLANNING OFFICER

MT/JB/DGP 9/85-4419

November 6, 1985

Ms. Jennifer J. Kleveno  
Dames & Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

Draft Environmental Impact Statement  
Ewa Marina, Increment II  
Dames & Moore Project No. 13822-001-11

We have the following comments regarding the draft  
Environmental Impact Statement for Ewa Marina, Increment II.

North-South Connector (Figure 5-12 and Pages 5-24 & 5-25)

The north-south connector road, as shown in Figure 5-12 of the dEIS, is not shown on the adopted Ewa DP/PF Map. An amendment to the DP/PF Map will be required. The Chief Planning Officer has initiated an amendment (85/EWA-1001) in the '85-86 AR to place the north-south connector road on the PF Map for implementation in the "7 years and beyond" time frame.

The proposed access road will cut through Tenney Village and run along the Honouliuli STP site. According to Gary Noda of DHCD (10/1/85), if the City undertakes the renovation of Tenney Village as it did for Fernandez Village, DHCD has no plans to relocate Tenney Village elsewhere. Thus, if the north-south connector road cuts through Tenney Village, displacement and relocation costs could be substantial. Varona Village could also be impacted.

The Estate is in a position to facilitate relocation and should initiate discussions and negotiations with the various county and State agencies on this.

Jennifer J. Kleveno  
November 6, 1985  
Page 2

There are some additional questions that need to be addressed. Who will pay for building the north-south connector road-will the State share some of the construction costs? What is the estimated cost? How long will the construction be?

The administration's policy is that some or all of these costs are to be borne by the developers/owners. There are precedents for this approach to development elsewhere in Honolulu, e.g., Kahekili Highway.

Sewage Treatment (Page 4-10)

In the dEIS, capacity of the Honouliuli Sewage Treatment Plant is projected to 51 mgd, with 11 mgd for Ewa Marina. The time-schedule for STP expansion is however, not provided.

The STP is being built in increments. Increment 4 is for upgrading to secondary treatment. The DP Public Facilities Map for the area shows proposed STP modification in the "Funds Appropriated" category. The PF file on this shows that this is for Increment 4.

DPW has since had its request for a waiver from secondary treatment approved by EPA, and hence upgrading to secondary treatment is not required at the moment.

The STP has a present capacity of 25 mgd. In fiscal 1984 the average sewage load treated was 15 mgd, leaving an excess of 10 mgd for future development. The City's commitment of this STP capacity to Ewa Marina should be noted. So far as we know, it only covers Increment I of the Ewa Marina development proposal.

DPW has no schedule for expansion of the Honouliuli STP to 51 mgd. Neither is this expansion on the DP PF Map for the area. The City has limited funds and this project is not a high priority item for DPW.

It would be appropriate for the developer of Ewa Marina and other developers in the vicinity to get together with the landowner and fund the necessary STP expansion. Again, there is precedent for this elsewhere on Oahu, e.g., at Mililani.

The timing of the Ewa Marina development and STP expansion should be discussed in the EIS.

Water Supply (Page 4-11)

The dEIS indicates a projected potable and non-potable water demand of 2.39 mgd and 0.63 mgd, respectively. (p. 6-14) Water demand by development increments is shown in Table 4-2.



Jennifer J. Kleveno  
November 6, 1985  
Page 3

In Table 4-2, the average water demand for a single family unit is listed as 500 gallons per day. This is low in comparison to the figure used in the BWS Oahu Water Plan, July 1982 which shows water demand for the Ewa water district as 316 gallons per capita per day (gpcd) for 1985. (p. 71) This could result in big differences in projected water demand.

The EIS should use the same factors as the BWS planners in order to have consistency in planning for the water system.

Discussion of alternatives for increasing the available water supply are considerably outdated. For example, the Board of Water Supply has dropped its plans to develop HECO's water for domestic use. While Oahu Sugar Company has had its water allocation from the Pearl Harbor Water Control District reduced by 22.5 mgd, the BWS has had its allocation increased by about 11 mgd.

Development of water sources in Waianae and Makaha Valley are still in the exploratory stage. Any water development here may only be sufficient for Waianae's own growth, and the reduction of import of water into Waianae is not likely to be significant or sufficient for Ewa Marina development.

Development of water at the Honouliuli Wells may be more promising than any of the alternatives discussed in the dEIS. But there is no discussion of this and the constraints to water development here. The Honouliuli Wells are shown in the BWS Oahu Water Plan of 1975, but not in the 1982 Oahu Water Plan.

The description of the sources of non-potable water and their impact is not complete. Discussion should include current Oahu Sugar Company's non-potable water wells and any requirement for additional wells. The impact of sustained groundwater withdrawal upon Oahu Sugar Company activities north of Ewa Marina and upon local hydrology should also be discussed. The Ewa Marina dual water system will be the first used on Oahu. The EIS should discuss the short and long-term impacts that may accompany the use of such a system.

#### Drainage

The dEIS indicates that:

"Drainage improvements include on-site ponding of stormwater in open spaces and upstream settling basins designed for 100-year storm flows from Kaloi Gulch with urbanization to the north (mauka) of the project. These improvements will reduce turbidity in stormwater input to

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the marina waters and will be designed in accordance with City and County standards. They will be dedicated to the public system, and provided by the developer. Drainage design details were provided in the Programmatic EIS." (p. 4-12)

Those who have not seen the Programmatic EIS are at a disadvantage in reviewing what is proposed for drainage at Ewa Marina. It is recommended that the relevant sections relating to drainage be excerpted in this EIS to provide reviewers an opportunity to gain a better understanding of what is proposed.

Later in the dEIS, it is indicated that:

"The interception of the sediment carried down the Kaloi Gulch will be achieved through the use of stormwater ponding areas within the greenbelt system, together with a 150-acre water retention basin upstream of the project area. Although the final retention volume has not yet been determined, it appears that a 150-acre basin could retain all of the Kaloi Gulch runoff from small storms, and that much of the impounded water could percolate into the ground. Benefits thus achieved would include diversion of suspended solids, oils, and often (sic) material contained in urban runoff as well as reduced frequency of marina water disturbance due to storms. Some groundwater recharge to the brackish upper aquifer also will occur." (p. 6-2)

The 150-acre water retention basins constitute a major land use. Accordingly, it is recommended that the EIS show generally where these are to be located, even if the locations cannot be precisely determined at this point in time. It may also be necessary, at some point in the future, to redesignate the retention basins to a more appropriate land use such as preservation.

The Department of General Planning has had development proposals which call for urbanization from Ewa Beach all the way to the Ewa Villages. A proposed refuse convenience station along Geiger Road is being relocated elsewhere because of the new development proposals. It is therefore imperative that DGP be given some idea as to the general location of the 150-acre retention basin necessary for the Ewa Marina project. This will avoid land use conflicts.

"The need for design elements to control the discharge of storm water into the marina, i.e., silt basins" was pointed out in a letter dated January 18, 1985 from the Department of the Army, U.S. Army Engineer District, Fort Shafter to Dames and Moore, the EIS preparers.

Jennifer J. Kleveno  
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The Dames and Moore response, dated February 11, 1985, indicated that "The proposed storm drainage system will be discussed in more detail in the Draft EIS."

We ask that the major elements of the drainage system be mapped to provide a better idea of what is proposed and thereby provide an adequate basis for reviewing proposed land use changes mauka of the Ewa Marina project.

#### Accident Potential Zones Versus Land Use (Figure 5-11)

The configuration of the small boat harbor situated within the Accident Potential Zone (APZ) II is not precisely the same as that shown on the adopted Ewa DP/LU Map. Further, the area designated for Commercial use mauka of the boat harbor is shown as Public Facility use in Figure 5-11.

Figure 5-11 (along with several others) should be corrected to reflect what is shown on the DP/LU map or the necessary amendments to the map should be initiated.

#### Noise (Page 5-22)

Discussion here deals mainly with ambient noise levels. While it is true that HUD will insure mortgages on new development in areas with ambient noise levels up to 65 dB (Ldn), HUD requires interior noise levels to be much lower.

Under HUD Environmental Criteria and Standards published in the Federal Register, July 12, 1979 and in 24 CFR Part 51, it is indicated,

"Interior Noise Goals. It is a HUD goal that the interior auditory environment shall not exceed a day-night average sound level of 45 decibels. Attenuation measures to meet these interior goals shall be employed where feasible. Emphasis shall be given to noise sensitive interior spaces such as bedrooms."

Discussion in the EIS should consider this, particularly in Hawaii where open construction for an open-air lifestyle is the norm.

#### Blasting for Marina Channels (Page 4-5)

Page 4-5 of the dEIS should be revised or expanded to indicate how blasting will affect the Ewa Beach community and the Honouliuli STP ocean outfall.

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Blasting activities at the Barbers Point deep-draft harbor damaged homes at Honokai Hale.

The distance between Barbers Point deep-draft harbor and Honokai Hale is approximately 1.5 miles. Ewa Marina, on the other hand, is basically an extension of the Ewa Beach community and the impact of blasting could be greater here than was experienced at Honokai Hale.

#### Disposal of Dredged Material (Pages 4-8 and 6-1)

The dEIS states:

"Maintenance dredging in the marina would be performed every five years removing an estimated 3,000 cubic yards of silt." (p. 4-8)

"Approximately 147,000 cubic yards of material will be removed" for the entrance channel. (p. 6-1)

The dEIS does not indicate who controls the off-shore disposal site, and whether a permit application has been submitted or discussed.

The estimated cost of the periodic dredging and the financial capability of the developers to assume this cost should be discussed.

#### Groundwater Loss Through Marina Walls

Under Groundwater Hydrology (p. 6-2) it is indicated that "The marina will not cause any direct loss of groundwater, but it will reduce the available groundwater storage volume in the coral aquifer."

Given the high water table in the area which caused cesspool failures at an excessively high rate, and the experience at the deep draft harbor, the above statement can be challenged. There should be some attempt to quantify the loss of groundwater through the marina walls.



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Jetties (Pages 4-4, 4-5 and 4-16)

Rock jetties are proposed along the entrance channel to protect the marina basin from waves and to prevent littoral drift from shoaling the channel. (p. 4-5)

"The breakwaters would act similar to groins along the beach. The eastern breakwater would trap sand transported offshore or westward around the rocky headland, enlarging Oneula Beach Park beach. The channel would intercept sand directed offshore around the head of the breakwater. The sand trapped in the channel probably does not contribute significantly to Nimitz Beach, and therefore erosion of Nimitz Beach due to entrapped sand would not occur. However, if erosion occurs on the downdrift side (at Nimitz Beach), the applicant would nourish the beach with similar beach sand, and by-pass sand around the breakwater and channel." (p. 4-5)

It appears that the marina channel would affect longshore transport of sand along the beach. To offset loss of sand through the channel, the jetties or breakwaters would be built. This would prevent or minimize loss of sand through the channel, but would result in sand building up against the eastern breakwater. The beach at the park would build up, but other beach areas could be adversely affected until the sand is redistributed. In the meantime the sand would build up offshore.

Whether the limu areas might be affected is not indicated. Sand "mining", even for this purpose is not presently under State law.

These should be discussed in the EIS.

Surf Sites (Page 4-5)

The dEIS indicates that a surf site will be destroyed. (Figure 4-12)

There is no discussion of the importance of this site, i.e., is this the most popular site at Ewa Beach? Neither is there any discussion of any mitigation measures or alternatives.

Figure 6-1 shows the site to be impacted is the largest of the six sites identified, and the surf site destroyed by the west breakwater is the largest within the site (Figure 6-2).

Jennifer J. Kleveno  
November 6, 1985  
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Discussion of Alternative Channel Alignments (Section 4.8.3, p. 4-15) lists one alternative which would avoid loss of the surfing site. This is Alternative 3, channel 300 yards west of the proposed channel. (Figure 4-22)

The dEIS indicates,

"This alignment eliminates any impacts to Oneula Beach Park and significantly reduces adverse effects on the surfing sites." (p. 4-16)

The developer's objections to Alternative 3 include:

- a. increased water residence time in the marina
- b. increase in internal travel time within the marina
- c. increase in land and dredging costs
- d. increase in auto traffic bound for the commercial area through the community and park. (p. 4-16)

However, there is no quantification except for water residence time in the marina. Figure 4-22 shows that residence times for the three innermost channels would increase to 15.8, 16.3 and 17.0 days for channels A, G, and K, respectively from 10.9, 11.4 and 12.1 days for the same channels under the proposed marina configuration. (Fig. 4-17)

The dEIS indicates that "Residence times for Hawaii Kai, a similar community, have been reported to be in (sic) the order of 30 days, and water quality within Hawaii Kai historically has been considered "acceptable". Therefore water quality within the proposed marina is also anticipated to be acceptable." (p. 4-7)

Based on this statement, the increase in water residence times under Alternative 3 would not adversely impact water quality. Increased water residence times do not constitute a valid basis for rejecting Alternative 3 in favor of the proposed marina configuration.

Alternative 3 would remove residential development from the high accident potential and high noise zones indicated in the Navy AICUZ.

There is currently a land use amendment being processed which will alter the land uses east of the Marina channel. This includes the slight shifting of the location of Oneula Beach Park on the DP land use map. The EIS should indicate whether this amendment will have any impact upon the channel entrance.

Jennifer J. Kleveno  
November 6, 1985  
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No Action Alternative (Page 4-15)

Would a "no action" alternative for Increment II be economically feasible for the developer?

If it is not, the dEIS should clearly state this and provide quantification i.e., cost figures.

Alternatives (Page 4-16)

The discussion of alternatives (Section 4.8.1, p. 4-15) should include more on the alternative of Development Without the Marina.

This would eliminate many adverse environmental impacts. Development costs would be reduced considerably. Housing prices could be lowered.

Another conceivable alternative that should be discussed involves the reduction in channel size and the use of bridges across the channel to allow movement along the shoreline.

Anticipated Permitting Schedule (Page 1-3)

Along with the Department of Land Utilization and the State Department of Land and Natural Resources, the Corps of Engineers (COE) also has permit jurisdiction over Increment II.

Page 1-3 of the dEIS, however, does not indicate the COE's permit schedule.

Appendix C - Agencies, Organizations, and Individuals  
Responding to the Notice of Preparation

There is no U.S. Department of the Navy input on this. This is surprising in view of the Navy's opposition to portions of the Ewa Marina development proposal.

Unresolved Issues

1. The dEIS lacks a discussion on unresolved issues. There have been two AICUZ reports prepared for the Barbers Point Naval Air Station facility--one by the U.S. Department of the Navy; the other by the Campbell Estate.

Of the two AICUZ documents prepared for Barbers Point NAS, the one prepared for the Navy is apparently more restrictive.

Jennifer J. Kleveno  
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As far as we know, there has been no resolution or settlement between the Navy and Campbell Estate on the Barbers Point NAS AICUZ on the noise exposure and accident potential zones.

2. The phasing of the north-south connector to Farrington Highway and Interstate H-1 is not indicated. At what point in time will a realigned and widened Fort Weaver Road be inadequate?
3. Expansion of the Honouliuli STP is not programmed. There is a problem of funding. Without adequate STP capacity, the project cannot proceed.
4. The source of water and the BWS commitment to this development is not indicated. The estimated water demand projections seem low.
5. The drainage system is not adequately described or mapped in the dEIS. Of particular interest to DGP is the location of the proposed 150-acre siltation basin to the north (mauka) of the project. There may be conflicting development proposed there.
6. An alternative location of the marina channel 300 yards to the west of the proposed site could avoid loss of a surf site and other impacts.

Sincerely,

  
DONALD A. CLEGG  
Chief Planning Officer



## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

City and County of Honolulu  
Department General Planning  
650 South King Street  
Honolulu, Hawaii 96813

D17

Attention: Mr. Donald A. Clegg  
Chief Planning Officer

Dear Mr. Clegg:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of November 6, 1985 and offer the following response to your comments.

### North-South Connector

The applicant realizes that a revision to the Ewa DP/PP Map is required. The estimated cost for the construction of the North-South connector has not been determined at this time. The issue of who will pay for construction is currently being discussed between the landowner, the developer, and the appropriate government agencies.

### Sewage Treatment

The 11 mgd figure refers to the projected flow capacity to accommodate future development between Makakilo and Halawa. Projected flow capacity for the Ewa Marina Community is 1.761 mgd. Present average daily flows at the Honouliuli Wastewater Treatment Plant (WWTP) are 17 mgd while the existing plant capacity is 25 mgd. An addition of 1.761 mgd to the present average daily flow will not require plant expansion. The sewer master plan for the Ewa Marina Community has been approved by the City and County of Honolulu Department of Public Works.

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City and County of Honolulu  
Department of General Planning  
December 4, 1985  
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### Water Supply

Design parameters used in planning the water system were established by the Board of Water Supply specifically for the Ewa Marina Community. The Water Master Plans for both the off-site and on-site water improvements have been approved by the Board of Water Supply.

The paragraph on Water Supply in the Draft EIS has been changed to note that development of the Waiau Springs Project has been deferred.

The Board of Water Supply has indicated that they are "currently working with Department of Land and Natural Resources to develop part of the 22.5 million gallons per day (mgd) of permitted use available in the Pearl Harbor Ground Water Control Area for developments planned in the Ewa Plain such as the Ewa Marina Community. The Board was allocated a permitted use of 2.0 mgd to drill new wells at Honouliuli. The source will be used for the Ewa Plain developments. We are presently working with Campbell Estate to drill additional wells in the Honouliuli area for the proposed development." Development of the Honouliuli wells has been included in the Final EIS.

A map showing the location of the proposed non-potable supply wells has been provided in the Final EIS.

A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina, including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II.

### Drainage

The location of the 125-acre water retention basin and design parameters are identified in the Preliminary Hydrologic Report for Kalo Stream Improvement by William Hee & Associates, Inc. (1981). A copy of this report has been provided for your reference (Attachment 1).

### Accident Potential Zones Versus Land Use

Configuration of the small boat harbor has been changed as a result of more advanced engineering techniques to provide wave protection for the moored boats. The applicant will initiate changes to the DP/LU map. The use of the Public Facility designation has been clarified on Figures 4-3 and 5-11.

### Noise

Normally sound attenuation for a typical residential unit of typical construction common in Hawaii is approximately 15 db with windows open and up to 25 db with windows closed. Closed windows would require some sort of mechanical ventilation.

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However, no residential units are currently planned in noise zones exceeding Ldn 62.5, and the typical exterior-interior noise reduction of 15 db (with windows open), results in an interior noise level of 47.5 db. The additional 2.5 db reduction to reach an interior level of 45 db can be achieved through orientation of structures. The U. S. Department of Transportation's "Guide to the Soundproofing of Existing Homes Against Exterior Noise," dated Oct. 1977, states:

"The sound levels at various points around the house will differ by virtue of the acoustical shielding from the noise provided by the house structure itself."

"The sound levels on the shielded sides of the house will be less than those on the sides facing the source."

"The wall facing the flight path will have a negligible reduction in noise level due to the shielding effects, while the wall furthest from the flight path will have higher shielding values at all frequencies ... the shielding is equivalent to an increase in attenuation of the shielded wall or window, thus the shielded elements of the house are not required to provide the same degree of attenuation as are the front and side walls."

The development parcels closest to the Ldn 62.5 noise contour are zoned for low density and medium density apartments with planned densities of from 10 to 33 units per acre. The assigned densities will require typical townhouse and/or multileveled structures. These types of units normally do not have full four-wall and roof exposure, therefore sound attenuation is greater and internal noise levels are further reduced. Orientation of these units will normally place the view on the shielded side of the basic noise source.

All residential units will be outside the 62.5 noise contour according to the CSR 24 HUD Part 51, Environmental Criteria and Standards document, dated April 1, 1984. Section 51.103, Criteria and Standards, paragraph C-2 states: "the noise environment inside a building is considered acceptable if (I) The noise environment external to the building complies with these standards and (II) the building is constructed in a manner common to the area or, if of uncommon construction, has at least the equivalent noise attenuation characteristics." The HUD site acceptability standards referred to above indicate that under special circumstances, the acceptable threshold may be shifted to 70 db in areas not exceeding 65. This is acceptable for residential construction with no special approvals and/or requirements.

### Blasting for Marina Channels

We are aware of damages that have occurred to homes due to blasting at Barbers Point Deep Draft Harbor. The exact nature and reasons of blast damage at Barbers Point is not clear; however, the effect has been realized. At the current EIS level of effort, the exact method of channel dredging has not yet

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been determined and will probably change depending on the capabilities of the contractor. Therefore, our response to your concern can only address the following:

1. If blasting is utilized, the design specifications shall include a blast plan indicating the spacing of the blast holes, the size of the charge, and the detonation patterns.
2. There will be a test program to validate the blast plan. The test program will utilize sensitive vibration monitoring equipment so that the blast plan can be validated or modified before it is implemented. During the test program, the severity of vibrations on residential structures can be quantified. In the event of a definite necessity of excavating hard coral too close to the residential area, the construction specification may prohibit the use of blasting. In such cases, coral excavation can proceed by using hydraulic hoe rams or hydraulic splitter techniques.

The Final EIS will mention the blast program.

### Disposal of Dredged Material

Disposal of dredged material at the off-shore disposal site is an Army Corps of Engineers (COE) permit concern. The COE controls the site. Off-shore disposal is currently an alternative. Should this alternative be selected, coordination will be made with the COE.

The cost of periodic dredging will be distributed among the boat owners. It is estimated that dredging fees will cost a boat owner approximately \$4.00 a year.

### Groundwater Loss Through Marina Walls

This topic will be discussed in the hydrogeologic study for the Corps' EIS.

### Jetties

The affect on limu during and after construction is discussed in Section 6.2.2 Marine Impacts. The Final EIS will mention that sand "mining" is not presently under State law.

### Surf Sites

We have discussed the loss of Sand Tracks with members of the surfing community in terms of the site's popularity, frequency of use, and quality of existing surfing conditions in comparison with other nearby sites (personal communication, John Kelly, June 1984). It appears that under varying wind and wave conditions, these qualities change among the various surfing sites. Since a site's popularity increases with favorable conditions and decreases



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with unfavorable conditions, a quantitative measurement of popularity in comparison to other sites is difficult to obtain.

Mitigative measures in Section 6.4.8 have been expanded and alternatives in reference to the surf site are presented in Section 4.8.3 Alternative Channel Alignments.

The land use amendment being processed will not have any impact on the channel entrance.

No Action Alternative

A no action alternative is economically infeasible for the developer. The loss to the developer is estimated to be approximately \$30 million.

The EIS is being expanded to include this information.

Alternatives

The alternative, Housing Without the Marina, has been expanded. With this alternative, housing prices may be lowered; however, recreational amenities provided by the marina would be eliminated, and the economics of the development would have to be reassessed.

The proposed marina configuration was designed to maximize boat safety, accessibility, water quality, and drainage. Reductions in channel size would jeopardize these parameters. Use of a bridge across the channel was not considered a viable alternative because it would prevent ocean going vessels from entering the marina.

Anticipated Permitting Scheduled

The COE permit schedule is not available at this time.

Unresolved Issues

1. The Ewa Marina Community has been designed so that the proposed residential sites do not exceed Ldn 65 in both the Navy and Campbell Estate AICUZ reports. Since the project conforms to both reports' criteria, this is not considered an unresolved issue.
2. Phasing of the north-south connector to Farrington Highway and Interstate H-1 is currently under discussion.
3. Expansion of the Honouliuli WWTW will not be required.
4. The Board of Water Supply has approved the Water Master Plan. Commitments to the source of water for the project have been defined in the Final EIS.

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5. The drainage plan has been approved by the City and County Department of Public Works. The location of the proposed 125-acre water retention basin is shown in the attached hydrologic study.
6. The impacts of various alternative entrance channel locations have been evaluated by the marina designers, and the proposed alignment has been selected.

Yours very truly,

DAMES & MOORE

  
Jennifer J. Kieveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)

Attachment 1 - Preliminary Hydrologic Report

LU 1185-4979

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813  
PHONE 823-4181



FRANK F. PABE  
MANAGER

ALVIN K. H. PANG  
DIRECTOR

November 4, 1985

MEMORANDUM

TO: John P. Whalen, Director  
Department of Land Utilization

FROM: Alvin K. H. Pang

SUBJECT: Draft Environmental Impact Statement  
Proposed Ewa Marina Community, Increment II  
Ewa Oahu

Increment II - Residential	- 307.5 acres
Community/Public Facility	- 69.9 acres
Preservation	- 27.5 acres
Marina	- 115.0 acres
Park	- 20.3 acres
Roadways	- 30.5 acres

Total Acres - 570.7 acres

Thank you for the opportunity to review and comment on the proposed Ewa Marina Community project in Ewa, Oahu.

We note that a total of 10% of the residential units or 485 units will be allocated for affordable housing. As you know, we are currently reviewing our policy relating to the ten (10) percent set aside and will inform you of any specific policy adjustment adopted.

Please contact Mr. James Miyagi of this Department at 523-4264 who will assist the developer in formulating a program to provide these units.

We will retain the Draft EIS report for our files.

*For Alvin K. H. Pang*  
ALVIN K. H. PANG

1985 NOV -5 AM 8:37  
DEPT. OF LAND UTILIZATION  
CITY & COUNTY OF HONOLULU

Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3583  
Cable address: DAMEMORE

December 4, 1985

City and County of Honolulu  
Department of Housing and Community Development  
650 South King Street  
Honolulu, Hawaii 96813

D25

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Attention: Mr. Alvin K. H. Pang  
Director

Dear Mr. Pang:

Thank you for reviewing the Draft EIS. We have received your letter of November 4, 1985 and offer the following response to your comments.

In regards to affordable housing, the applicant has contacted Mr. James Miyagi of your department and will be formulating a program to provide affordable units in the Ewa Marina Community.

Yours very truly,

DAMES & MOORE

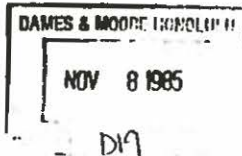
*Jennifer J. Kleveno*  
Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)



DEPARTMENT OF LAND UTILIZATION  
**CITY AND COUNTY OF HONOLULU**  
650 SOUTH KING STREET  
HONOLULU, HAWAII 96813 • (808) 929-4632

FRANK F. FASI  
DIRECTOR



JOHN P. WHALEN  
DIRECTOR

(RF)

November 7, 1985

Ms. Jennifer J. Kleveno  
Dames & Moore  
1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816

Dear Ms. Kleveno:

Draft Supplemental Environmental Impact Statement (SEIS)  
for the Proposed Ewa Marina Community Increment II  
Honouliuli, Ewa, Oahu

We have reviewed the Draft SEIS and have the following comments to offer:

1. Reference: Section 4.1 Project Summary

Comment: The Ewa Development Plan Land Use Map should be included. The "Proposed Zoning" exhibit (Figure 4-5) is inaccurate. There is no "Public Facility" zoning district; and the proper designation for Preservation District is "P-1".

2. Reference: Section 4.2.6 Public Access

Comment: Will boat launch ramps be provided for use by the public? If so, at what location(s)? Will public automobile and trailer parking also be provided?

3. Reference: 4.5 Parks and Preserves

Comment: We question the accessibility and usefulness of the proposed 4.7-acre "neighborhood park" inasmuch as it is isolated by the main access drive from apartment and residential areas.

Ms. Jennifer J. Kleveno  
Page 2

4. Reference: Section 6.1.5 Accoustical Impact

Comment: Due to aircraft noise, sound levels at proposed residential sites currently approach the maximum for such uses of 65 Ldn. The development of the Ewa Marina Community will cause increases in ambient noise levels, owing to automobile and boat use and other urban activities. What will be the overall Ldn level for various areas of the site?

5. Reference: Section 6.3.1 Housing

Comment: The Draft should discuss alternatives if any of how the applicants intend to address affordable housing needs within the project.

6. Reference: Section 6.3.2 Population Impacts

Comment: The Draft should relate the projected population of the project to the population objectives of the Oahu General Plan.

7. Reference: Surfing, p. 6-16

Comment: According to the Draft SEIS, there will be four surfing sites located on the western side of the proposed entrance channel (Figure 6-1). What provision will be made for public access to these sites? Will public parking be provided?

8. Reference: Section 7.0

The Draft lacks a discussion of the project's consistency with objectives and policies of the Hawaii Coastal Zone Management Program (Chapter 205A, HRS, Part 1).

If there are any questions, please contact Robin Foster of our staff at 527-5027.

Very truly yours,

JOHN P. WHALEN  
Director of Land Utilization

JPW:s1  
2503A

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-1585  
Cable address: DAMEMORE

December 4, 1985

City and County of Honolulu  
Department of Land Utilization  
650 South King Street  
Honolulu, Hawaii 96813

Attention: Mr. John P. Whalen  
Director

Dear Mr. Whalen:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of November 7, 1985 and offer the following response to your comments.

1. Reference: Section 4.1 Project Summary

The Ewa Development Plan Land Use Map has been included in the Final EIS as Figure 4-4. In Figure 4-5, the "Public Facility" zoning notation and the "Preservation" notations have been placed under the title "Special Design District Codes" instead of "Honolulu City & County Zones". This is based on the Department of General Planning's recommendations that these areas be implemented under Article B, Special Design District of the Comprehensive Zoning Code, as stated in the Re-zoning Application for Increment II (September 1985).

2. Reference: Section 4.2.6 Public Access

Boat launch ramps will be provided for use by the public. Figure 4-6 in the Draft EIS, "Marina Boat Slip Layout" has been modified to include the boat launch locations. Public automobile and trailer parking will also be provided.

3. Reference: Section 4.5 Parks and Preserves

As mutually agreed upon by the Department of Parks and Recreation and the developer, Park Site #4 will be relocated to a more central and serviceable location when the northerly area is developed.

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City and County of Honolulu  
Department of Land Utilization  
December 4, 1985  
Page 2

4. Reference: Section 6.1.5 Acoustical Impact

Residential units will not be constructed in the areas exposed to over 65 db. After discussion of air craft noise, the other significant noise source in any urban area is motor vehicle traffic. Unlike aircraft noise, the noise exposure from motor vehicles is confined to relatively narrow corridors adjacent to the roadways. The noise from passenger cars is generated close to the surface and decreases with increasing distance from the roadway. This decrease in noise level is further affected by structural and terrain barriers adjacent to the roadway as well as excess attenuation produced by the ground surface. As a result, traffic noise is not a significant problem in the small neighborhood clusters planned for the Ewa Marina Community. The small neighborhood clusters are accessed by a single connector from local collective streets and there will be no through traffic in these neighborhoods. Internal neighborhood streets will experience minimum traffic and minimum noise from this source. The typical internal low density neighborhood in Ewa Marina Community should experience noise levels of approximately 50 db at typical building setback lines. [Refer to HUD Noise Assessment Guidelines, 1983]

Noise generated by automobile traffic along the major collector streets will be controlled by structural and terrain barriers (walls and berms) separating the residential neighborhoods from primary circulation.

Boat traffic noise is also local and can be minimized by structural and terrain barriers and by building orientation. Wet boat storage slips will average over 30 feet in length and consequently attract sailing and motor yachts with generally quiet sources of power. Speed limits will be set and strictly enforced resulting in minimum power requirements for boats underway.

Launching of high-powered trailored boats will be restricted to the non-residential areas. Boat maintenance will be restricted to commercial areas. Any noise from boat sources will be sporadic and primarily limited to the marina corridor.

The noise from these different sources is added or increased by combining noise energy. At those locations where the individual noises, i.e. air craft, motor vehicle or other sources, are sufficiently close to the same level to result in a major change in overall level, two noises of the same level will increase by a maximum of 3 db or 3 Ldn. Thus, a location exposed to 62.5 Ldn aircraft noise and 62.5 Ldn traffic noise experiences a total environmental noise exposure of 65.5 Ldn within the traffic corridor. If one of the noises is 3 Ldn below 62.5, the combined noise level is 64.3. The combined level is reduced to 62.8 Ldn as the difference between the two noises is 12 Ldn. The increase in combined sound level will occur only within a corridor close to the roadway where aircraft and traffic noise levels intersect.

The continuous environmental background noise in an urban area is determined by roadway noise. The Ldn value for aircraft noise comprises a series of isolated, short duration events. There is no documentation describing the overall response of people to the combined effects of these widely disparate types of noises.



## Dames & Moore

City and County of Honolulu  
Department of Land Utilization  
December 4, 1985  
Page 3

5. Reference: Section 6.3.1 Housing

The developer has contacted Mr. James Miyagi of the Department of Housing and Community Development and will be formulating a program to provide affordable housing units in the Ewa Marina Community.

6. Reference: Section 6.3.2 Population Impacts

The projected population of the Ewa Marina Community relative to the population objectives of the Oahu General Plan has been included in the Final EIS.

7. Reference: Surfing, p. 6-16

Public access will be provided along the shoreline and through the preservation area. Public parking will also be provided.

8. Reference: Section 7.0

A discussion of the project's consistency with the objectives and policies of the Hawaii Coastal Zone Management Program is included in the Final EIS.

Yours very truly,

DAMES & MOORE



Jennifer J. Kleveno  
Assistant Environmental Scientist

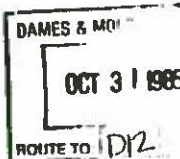
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DEPARTMENT OF PARKS AND RECREATION  
CITY AND COUNTY OF HONOLULU

850 SOUTH KING STREET  
HONOLULU HAWAII 96813



October 25, 1985



TOM T. NEKOTA  
DIRECTOR

TO: JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION

FROM: TOM T. NEKOTA

SUBJECT: DRAFT EIS AND ZONE CHANGE REQUEST  
EWA MARINA COMMUNITY, INC. II - HONOLULU  
TMK 9-1-12: 7-17, par. 2, 5 & 6  
PROJ. REF. NO. 85/2-18

We have reviewed the Draft EIS and the Zone Change Request for the Ewa Marina Development, Inc. II and make the following comments and recommendations:

Our review of the Draft EIS and the Zoning Change request shows two park concerns which require clarification before we can approve the zoning application.

These concerns are as follows:

1. Park Site #3. The configuration of the proposed park site in both the Draft EIS and Zoning reports are in conflict. Since the location of Park Site #3 is definite, the configuration should be consistent in both reports. Any changes to the park site must be approved by our Department.
2. Park Site #4. The park site, as designated in both reports, is unacceptable. Page 24 in the zoning report states: "Future plans .... call for the expansion of this park later when the northerly area is developed." We would like to clarify this statement.

We approved the location of Park Site #4 in the Ewa Development Plan only on the basis that the park would be located in the general area of needs and with an understanding with the applicant that the park would be relocated to a more central and serviceable location when the northerly area is developed.

The concerns of Park Sites #3 and #4 should be resolved as soon as possible. We would like to emphasize that close coordination is needed to properly establish park sites proposed to be dedicated to the City for park purposes. Parks to be dedicated to the City must meet our Department's standards and requirements so that we may plan our physical facilities and programs to adequately serve the Ewa Marina Development.

Mr. Whalen  
Page 2  
October 25, 1985

Thank you for the opportunity to review and comment on the Ewa Marina Community, Inc. II Development.

Should you have any questions, please call Mr. Jason Yuen at ext. 6315.

*Tom T. Nekota*  
TOM T. NEKOTA, Director

TTN:el (J. Yuen, Advance Planning)

cc: Dames & Moore  
MSM & Assoc., Inc.



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

City and County of Honolulu  
Department of Parks and Recreation  
650 South King Street  
Honolulu, Hawaii 96813

D12

Attention: Mr. Tom N. Nekota

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Nekota:

Thank you for reviewing the Draft EIS. We have received your letter of October 25, 1985 and offer the following response to your concerns.

1. Park Site #3. The configuration of the proposed park site is correct as shown in Figure 4-5 of the Draft EIS.
2. Park Site #4. As mutually agreed upon with the developer and your department, park site #4 will be relocated to a more central and serviceable location when the northerly area is developed.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:cb(2446A/129B:13822-001-11)

DEPARTMENT OF PUBLIC WORKS  
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET  
HONOLULU, HAWAII 96813

FRANK P. FASI  
MAYOR



October 9, 1985

RUSSELL L. SMITH, JR.  
DIRECTOR AND CHIEF ENGINEER

ENV 85-268

D 5

MEMORANDUM

TO: MR. JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION

FROM: RUSSELL L. SMITH, JR., DIRECTOR AND CHIEF ENGINEER  
DEPARTMENT OF PUBLIC WORKS

SUBJECT: EIS FOR THE PROPOSED EWA MARINA COMMUNITY  
INCREMENT II, EWA, OAHU, HAWAII

We have reviewed the subject EIS and have the following comments.

1. With respect to the planned 125-acre flood control basin north of Increment II, what is the status of this private facility? At the time of William Kee's Hydrologic Report (March 1981), a detention basin was planned in conjunction with the proposed Kaloi Stream Improvement and the Oahu West Development. Are these projects still active? If not, who will be responsible for the construction of the retention basin?
2. Clearance requirements for the bridge serving Area "2" should be ascertained. A U. S. Coast Guard bridge permit may be required.
3. Algae (limu) proliferates in the waters off Ewa Beach. At times the coastline is strewn with limu deposited by on-shore currents or storms. Unless the deposited limu is removed by natural forces or by maintenance crews, it is eventually decomposed and has caused odor problems in the past.

The City maintains an open channel box culvert which discharges directly on-shore at Ewa Beach. Limu enters the channel but is not easily flushed by the daily tidal prism. Decomposing limu has also caused odor problems.

The flushing phenomena of the marina should be carefully evaluated to avoid actual problems which have occurred in man-made facilities in Ewa Beach and the Ala Wai Canal. Trash, litter and limu may

Mr. John P. Whalen

-2-

October 9, 1985

eventually accumulate at the marina "dead-ends" and may have to be removed manually (mechanical means). The discussion on marine flushing is comparatively weak when compared with West Beach's analysis of the lagoon and marina.

4. The sewage quantity of 7.653 mgd for Increment II does not seem reasonable. In terms of population equivalent (100 gallons per capita per day), the total average flow is equivalent to a tributary population of 76,530 people. In Table 4-2, the total projected potable water demand (average flow) for Ewa Marina Community is 1.593 mgd. Sewage quantity cannot exceed quantity of water consumed, unless infiltration into the sewer system occurs because of faulty design and construction.
5. The existing capacity of the existing Honouliuli WWT is 25 mgd. This capacity should be mentioned in addition to the ultimate capacity of 52 mgd. Ultimate plant capacity can always be increased if additional land area is available. Existing capacity on the other hand is fixed by existing structures. Future plant capacities may be jeopardized with the potential demise of the Clean Water Act construction grant program.
6. Many maintenance problems are created whenever sewer siphons are constructed. Settleable and suspended solids in the effluent will have a tendency to collect and become permanently entrapped in the siphon. Flows for the outfall sewer are designed to have self-cleansing velocities but rarely materialize at the early periods because the sewer is designed for ultimate flows. Small pipe sizes may be substituted to increase velocity, but friction losses are increased and overall capacity is reduced.  
  
The Barbers Point outfall is in operation and has to be kept in operation during the construction of the siphon. The developer's engineers should meet with the Division of Wastewater Management early in the planning stage of the proposed siphon to discuss the design alternatives for connection to the operational outfall.
7. Regulatory policies and regulation of dual water systems will probably be the responsibility of the Honolulu Board of Water Supply and not the Department of Public Works (page 4-11).
8. Collection of refuse and other solid wastes (page 4-13) from single family residences is usually by the City's Division of Refuse Collection and Disposal. Collection from apartment units depends upon accessibility and the use of bulk containers. Commercial establishments are served by private refuse collectors. However, on page 6-15, it is stated that collection and disposal will be accomplished by private refuse companies. Clarification should be provided.

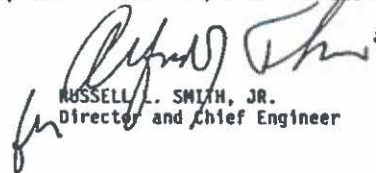


Mr. John P. Whalen

-3-

October 9, 1985

9. Average total phosphorus (P) concentration in Table 5-17 is listed in microgram units. Actual averages are in milligram per liter (mg/l). Stations listed are former WQPO (DPW) stations. Data given are outdated and represent off-shore open coastal waters.

  
RUSSELL L. SMITH, JR.  
Director and Chief Engineer

cc: Dames & Moore

## Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 733-3583  
Cable address: DAMEMORE

December 4, 1985

Mr. Russell L. Smith, Jr.  
City and County of Honolulu  
Department of Public Works  
650 South King Street  
Honolulu, Hawaii 96813

D5

Dear Mr. Smith:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 9, 1985 and offer the following response to your comments.

1. The planned 125-acre flood control basin is part of the drainage master plan that has been approved by the City and County of Honolulu, Department of Public Works. The projects that will develop the flood control basin are still active. The existing drainage channel will be used until these projects are developed.
2. Clearance requirements for the bridge serving Area "3" will be handled during the design phase.
3. A "litter patrol" will be employed to remove trash, litter, and limu that may collect in the marina and cause flushing or odor problems.
4. The sewage quantity of 7.653 mgd represented peak flows. The text has been changed to reflect average daily flows as presented in the following table.

## Dames & Moore

Area	Residential Units	Average Sewage Quantity (million gallons/day)
2		0.153
3		0.090
4		0.196
5		0.161
7		0.127
I	95	0.030
K	391	0.125
L	236	0.076
M	229	0.073
N	133	0.043
P	143	0.046
Q	614	0.138
R	92	0.029
S	217	0.069
T	60	0.019
U	82	0.026
V	146	0.047
W	121	0.039
X	278	0.089
Y	552	0.124
Z	190	0.061
Total	3,578	1.761

5. The text has been adjusted to include the existing capacity of the existing Honolulu WWTTP.
6. The developer's engineers will meet with the Division of Wastewater Management early in the planning stage of the proposed siphon to discuss the design alternatives for connection to the operational outfall.
7. The text has been changed to reflect that dual water system plans would be established in accordance with existing (and yet to be determined) regulations, statutes, procedures, and policies established by the Honolulu Board of Water Supply instead of the Department of Public Works.

## Dames & Moore

8. The sections on solid waste disposal have been changed to read as follows:

§ 4.6.5: "Collection and disposal of solid waste generated by single family residences, such as those to be included in the Ewa Marina Community, are usually the responsibility of the City and County of Honolulu's Department of Public Works, Refuse Collection and Disposal Division. Apartment units will be served by the City or by private refuse collectors, and commercial establishments will be served by private refuse collectors."

§ 6.4.4: "The collection and disposal of the solid waste generated will be by private refuse companies and by the City and County of Honolulu's Department of Public Works."

9. Table 5-17 has been corrected as specified. Thank you for pointing out the errors.

Yours very truly,

DAMES & MOORE

*Jennifer J. Kleveno*  
Jennifer J. Kleveno  
Assistant Environmental Scientist

JJR:ob(2446A/129B:13822-001-11)



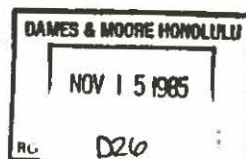
DEPARTMENT OF TRANSPORTATION SERVICES  
CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING  
450 SOUTH KING STREET  
HONOLULU, HAWAII 96813



November 13, 1985

TE9/85-4464  
TE9/85-4503  
PL 1.0101  
PL 1.0102



MEMORANDUM

TO: JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION

FROM: JOHN E. HIRTEN, DIRECTOR

SUBJECT: EWA MARINA COMMUNITY - INCREMENT II  
DRAFT ENVIRONMENTAL IMPACT STATEMENT  
REQUEST FOR ZONE CHANGE  
TMK: 9-1-12: 7-17, POR. 2, 5 AND 6

This is in response to OEQC's letter of September 24, 1985 and your memorandum of September 26, 1985.

We have reviewed the subject documents and offer the following comments/recommendations:

1. Modifications to the internal roadway alignments, as shown in the reports, may be required and compliance to all applicable highway design standards and criteria must be maintained;
2. Widths of the internal roadways should be designed to facilitate and provide for the smooth flow of traffic;
3. The alignment of Road "A" through the second increment should be revised to eliminate the sharp horizontal curves currently proposed;
4. The intersection of Roads "A", "D" and the North-South Road should be realigned to decrease the number of conflicting traffic movements;
5. Road "B" extending from the Ewa Plantation development should be shown and realigned to intersect Road "A" at Road "C".

John P. Whalen, Director  
November 13, 1985  
Page 2

We have no objections to the requested zone change being proposed for the subject development.

If you have any questions, please contact Kenneth Hirata of my staff at Local 5009.

(for) JOHN E. HIRTEN

✓ cc: Dames & Moore  
Attn: Jennifer J. Kleveno

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3583  
Cable address: DAMEMORE

December 4, 1985

City and County of Honolulu  
Department of Transportation Services  
650 South King Street  
Honolulu, Hawaii 96813

D26

Attention: Mr. John E. Hirten  
Director

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Hirten:

Thank you for reviewing the Draft EIS. We have received your letter of November 13, 1985 and offer the following response to your comments.

1. The applicant understands that modification to the internal roadway alignments may be required and will maintain compliance with all applicable highway design standards and criteria.
2. Widths of internal roadways were designed to facilitate and provide for the smooth flow of traffic.
- 3., 4., and 5. The applicant realizes that the roadway alignments shown in the EIS are preliminary and subject to the approval of your department. The applicant will meet with your department to define the appropriate roadway alignments.

Yours very truly,

DAMES & MOORE

Jennifer J. Kievena  
Assistant Environmental Scientist



POLICE DEPARTMENT  
CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET  
HONOLULU, HAWAII 96814 (808) 943-3333

FRANK F. FASI  
MAYOR



OUR REFERENCE: DI-JS

October 9, 1985

TO: JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION

FROM: DOUGLAS G. GIBB, CHIEF OF POLICE  
HONOLULU POLICE DEPARTMENT

SUBJECT: REQUEST FOR ZONE CHANGE - EWA  
EWA MARINA (INCREMENT II)  
TAX MAP KEY: 9-1-12: 7-17, POR. 2, 5 & 6; and  
DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) PERTAINING  
TO THE PROPOSED EWA MARINA COMMUNITY INCREMENT II

On March 7, 1984, the Honolulu Police Department responded to a request for comments on the Ewa Marina Community project. As stated in that letter, our chief concern in the development of Ewa and Central Oahu areas continues to be the impact of significant increases in traffic on public safety.

"We have been noting with increasing concern, the extensive development in the Ewa and Central Oahu areas and the large number of proposed developments... We are concerned about the traffic that will be generated by the sum of these proposed developments, not only on the surrounding roads (as the impact of Ewa Marina on Fort Weaver Road) but, of more concern, the impact on the H-1, Honolulu bound."

In general, we believe that the present thoroughfare leading into Honolulu from Central Oahu (H-1) does not appear to be capable of handling the traffic that will be generated by all the proposed residential development from both Central Oahu and Ewa. As stated in other EIS reviews, it would be desirable if a determination could be made of the total traffic impact on the existing and planned arteries serving Honolulu from the Central Oahu and Ewa areas. This determination, based on all planned and proposed developments, would greatly assist in determining the traffic safety impact of the individual developments.

Thank you for allowing us to comment on this matter.

DOUGLAS G. GIBB  
Chief of Police

cc: Dames & Moore

Dames & Moore

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

Mr. Douglas G. Gibb  
Chief of Police  
City and County of Honolulu  
Police Department  
1455 South Beretania Street  
Honolulu, Hawaii 96814

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Gibb:

Thank you for reviewing the Draft EIS. We have received your letter of October 9, 1985 and offer the following response to your comments.

The applicant is working with the City and County Department of Transportation Services to assure that the roadways in the vicinity of the development meet their approval. Determination of the total traffic impact on the existing and planned arteries serving Honolulu from the Central and Ewa areas is more properly the responsibility of the State of Hawaii Department of Transportation. We have discussed in the Draft EIS traffic impact from the Ewa Marina Community Development but do not have the resources to assess the impact from all proposed developments in Central and Ewa Oahu.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleven  
Assistant Environmental Scientist

JKK:ob(2446A/129B:13822-001-11)



## University of Hawaii at Manoa

Environmental Center  
Crawford 317 • 2550 Campus Road  
Honolulu, Hawaii 96822  
Telephone (808) 948-7301

November 7, 1985

RE:0427

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Draft Environmental Impact Statement  
Ewa Marina Community Increment II  
Ewa, Oahu

This draft environmental impact statement (EIS) addresses the potential environmental impacts related to the development of the Ewa Marina Community, Increment II, a secondary water-oriented urban area on the Ewa Plain. The Environmental Center review has been prepared with the assistance of Doak Cox, Emeritus Geophysicist; Paul Ekern, Water Resources Research Center; Frans Gerritsen and Hans-Jurgen Krock, Ocean Engineering; and Walington Yee, Environmental Center.

### General comments

Increment II of the Ewa Marina Community project will include 307.5 acres of residential units, 64.9 acres of commercial facilities, 27.5 acres in preservation, 115 acres of marina, 20.3 acres in park and 30.5 acres in arterial roadways. In contrast, Increment I will provide approximately half the residential acres (148.6), 14 acres of arterial roadway and only 2 acres will be commercial facilities and 4.4 acres in park. In contrast to the Increment I EIS, the draft EIS for Increment II presents only a brief overview of the impacts and needs of the residential and commercial aspects of the development and expands almost entirely on a discussion of the proposed marina. Since it is stated in the draft EIS (p. 1-2) that the Corps of Engineers will be preparing a separate EIS to address concerns relative to the marina, the State's final EIS should concentrate on the impacts associated with the residential and commercial development including a full discussion of the infrastructure needs and the cumulative impacts of this project in relation to other developments in west Oahu.

Mr. John P. Whalen

-2-

November 7, 1985

### Project description and alternatives (p. 4-1)

The frequent comparison of the proposed Ewa Marina development to the marina at Hawaii Kai is inappropriate and inaccurate (pp. 4-1, 4-7, 4-8). The marina at Hawaii Kai was developed from an existing fishpond/waterway, not agricultural land. The surface drainage to Hawaii Kai marina is minimal, no appreciable agricultural acreage drains into the Hawaii Kai Marina in contrast to the cane lands associated with the 11.5 square mile watershed of the Kalo Gulch flood plain. The high nutrient content of the groundwater flowing into the Ewa Marina due to the agricultural practice in the area, is another contrast to the Hawaii Kai marina which has no comparable source of high nutrient influx.

### Proposed marina and waterways (p. 4-3)

The draft EIS indicates that the marina walls will not be lined, however, the presence of frequent large cavities in the coralline reef rock to be excavated is recognized (pp. 4-3 and 5-5). Experience at the Hawaii Kai marina dictates that unlined marina walls create unstable conditions to adjacent properties and contribute to turbidity and marina sediments. The need for a wave absorber is cited (p. 4-3 and fig. 4-10), however, no information is provided as to the basis for its design or location. The results of a systematic evaluation between the alignment of the channel and the wave climate should be included in the final EIS. A discussion of the effects of the channel alignment on sand transport should also be addressed. We strongly recommend that a hydraulic model of the marina be developed to examine the various physical parameters such as resonance, and flushing rates essential for adequate engineering design.

### Jetties (pp. 4-4 and 4-5)

The proposed breakwater is designed to rest on coralline substrate and it is stated that no filter or keying of the structure into the coral would be necessary. Has the design of the jetty taken into account the 9.0 ft (above mllw) historic tsunami runup at Ewa Beach (8 ft mllw) and the current velocities associated with such tsunamis, particularly with respect to high currents in the entrance channel?

### Littoral drift (p. 4-5 and 5-16)

The draft EIS concludes that erosion of Nimitz Beach due to entrapped sand would not occur. However, in the discussion of alternative locations for the entrance channel (p. 4-16) the probable erosion of the west side of the jetty is cited in each alternative. These conclusions are inconsistent. We note also (p. 6-1) that if downdrift beaches are eroding over a long time by an amount similar to the volume that has been accreting in the fillet trapped by the west breakwater, that the material should be periodically removed and used to nourish eroded beaches. Unfortunately, the material trapped may not equal the amounts lost since the two processes are rarely if ever equal. Sand may be lost to deep water by alterations in long shore currents and reflected wave energies so that permanent loss of sand to the littoral cell may occur. The potential permanent loss of sand to Nimitz Beach should be addressed in the final EIS.



Marina construction procedure (p. 4-5)

We note that it is only a half-mile from the nearest residence to the area that will likely require blasting. Since residences over 1 mile away from Barbers' Point Harbor experienced damage from blasting, this issue should be more fully addressed. We are pleased to note that the blast area would be searched for marine mammals and sea turtles prior to blasting and that such blasting would be halted if any were in the area.

Drainage into marina (p. 4-6)

Calculations for fresh-water infiltration into the marina should be supplied considering the high-nutrient content of the ground water as previously mentioned. Omission of this data is a serious inadequacy.

Using the new Barbers Point Harbor which is stratified as evidence, its proximity to the project site would indicate that the Ewa plain drainage is very likely to stratify the proposed marina. Using infiltration data, we suggest that the exchange characteristics with residence time and growth rate of plankton be re-estimated for the Marina. (See above recommendation for model studies.)

The use of "dry wells" to "increase storm water percolation and decrease flows into the marina" is not likely to be effective in this area.

Marina flushing (p. 4-7)

The comparison of the flushing capability of the Hawaii Kai Marina and the Ewa Marina is not appropriate because of the significant differences in geographic location, offshore wave climate, meteorological conditions, ground water characteristics and marina channel configurations. As stated, the high-nutrient influx of the Ewa plain coupled with the lengths of the channels, suggests that residence times are most likely to result in excessive phytoplankton blooms.

Marina maintenance (p. 4-8)

The draft EIS states that maintenance is to be handled by the applicant. This is a major and costly issue in Hawaii Kai and has been an issue also in the Enchanted Lakes area of Kailua. What time scale is expected for the applicant to continue management and what provisions will be made for the long term maintenance of the marina after completion of the project?

Public utilities (p. 4-13)

Recognition of the high solar generation potential of the location should be included along with tables of solar insolation for the Ewa or Honolulu districts.

Alternative marina configurations (p. 4-15)

The alternative of housing without the marina should be more fully developed. The construction of the small boat harbor at Barbers' Point, as is presently authorized by the Corps of Engineers, (p. 4-16) could be considered as an alternative focus for marine recreation for Ewa Beach residents.

Archaeology (pp. 5-13 to 5-20)

See attached comments.

Hydrology (p.6-2)

What will be the effect on the caprock aquifer from the intrusion of salt water and seepage of fresh water due to the dredging of the marina? Will the Oahu Sugar Company's use of 25 mgd from the caprock aquifer, be affected?

Tsunamis (p. 5-16, 6-5, 6-6, Appendix B)

The statement on page 5-16 that the U.S. Government Flood Insurance Rate Map shows an 8-foot inundation zone based on a "100-year cycle" is misleading, implying that 8-foot tsunamis occur at regular 100-year intervals. It would be better to say that on the average a tsunami with a runup height as great as 8 feet (above mean sea level) would occur once in a 100 years, or that the 100-year tsunami would have an 8-foot runup height; and that the inundation zone shown has been estimated for such a tsunami.

As indicated on page 5-16, the runup heights listed for historic tsunamis in the table on the fifth page of Appendix B are given in feet above mllw. Equivalent runup heights above msl are about 1 foot less. Appendix B is incorrect in stating that historic tsunamis referred to did not produce bores. The 1946 and 1960 tsunamis produced bores in several places, but probably not at Ewa Beach. The 100-year runups estimated by the Corps of Engineers, it should be noted, are assumed ordinarily to be at a locus about 200 feet inland from the shoreline.

Of serious concern is an apparent oversight/error in the estimation of the effects of resonance in the marina. It was assumed that the 1960 tsunami would have had, at the marina entrance, a height of 4.1 ft mllw, the same as the height at the Honolulu tide gage. The actual runup height at the site of the marina entrance was 9 ft mllw. Hence the resonance estimation of 7.5 ft seems to underestimate considerably the heights of a 1960-type tsunami in the marina. This could have a major effect on the proposed structures if the revised figure exceeds the proposed 10 feet structure elevation. The resonance calculations should be repeated using the 9.0 ft figure.

October 16, 1985


Mr. John P. Whalen

-5-

November 7, 1985

Thank you for the opportunity to comment on this draft EIS.

Yours truly,

  
Jacquelin N. Miller  
Acting Associate Director

cc: DEQC  
✓ Dames & Moore  
Patrick Takahashi,  
Acting Director, Environmental Center  
Paul Ekern  
Frans Gerritsen  
Hans-Jurgen Krock  
Oak Cox  
Wallington Yee  
Matthew Spriggs  
Bertell Davis

MEMORANDUM

TO: Jacquelin Miller, Environmental Center  
FROM: Matthew Spriggs, Anthropology  
SUBJECT: Draft EIS  
Ewa Marina Community II  
Ewa, Oahu

At the end of the EIS, two reviews of the "Pre-Draft EIS" are included which address archaeological concerns, one by the State Historic Preservation Officer, Susumu Ono and the other by Bertell Davis who wrote the original archaeological survey report. Both expressed serious concerns which have not been addressed by the subsequent draft EIS. Mr. Ono makes four important points:

1. A comprehensive archaeological survey needs to be conducted in the project area.
2. Clarification is needed concerning the National Register status of the One'ula archaeological district.
3. Future work should be coordinated with the Historic Sites Section, DLNR (he notes that there has been no coordination so far in the project).
4. Plans for site preservation are inadequate and more sites need to be preserved. Mr. Ono notes that specific recommendations would be inappropriate until the complete survey is done and his office has had the opportunity for a site inspection. No site should be destroyed without proper study and the plans for preservation need to take into account the public use potential of the sites.

However, in the draft EIS no mention is made of any intention to do a comprehensive intensive survey, no clarification of the National Register status is given, no additional sites are mentioned as candidates for preservation, and there is no discussion of the public use potential of the sites. Similarly, Bertell Davis' letter contains a detailed critique of the archaeological section of the "Pre-Draft EIS." It does not seem that any of the points he made have been incorporated in the draft EIS as was promised in Dames and Moore's reply to him. For instance, Dames and Moore replied that "a major concern will be to improve graphic information on site locations. . . it will be revised to emphasize the variability in size and shape of the archaeological features." Nothing of the kind appears to have taken place. I strongly suggest that the EIS not be accepted until detailed consideration is given to the points raised by Mr. Ono and Mr. Davis.

I will now review the document itself. Like Davis and Ono, I find the archaeological section most unsatisfactory. It is vague, misleading and unprofessional. A "short reconnaissance" is mentioned although we are not even told who conducted it and no report on it is appended to the EIS. The limited aims were:

"for the purpose of evaluating the present conditions of the previously identified sites, to provide supplementary data on their significance and to recommend appropriate action in view of the Increment II development plans" (page 5-18).



Even these limited objectives were not attained and the exercise (from what little information we are given about it) appears to have been a failure. We are told "only some of the originally identified sites were relocated and examined and no investigation above the level of a short reconnaissance was performed." In fact it appears that only 23 of the 43 features slated for preservation were re-examined, and only 15 of the 64 to be destroyed were relocated! I can find no supplementary data on their significance except a suggestion (p. 5-19) that of the 3206 structures

"in some cases it is questionable whether they are of ancient origin or are the remains of modern bench activity. This observation may apply to the other coastal features previously recorded in survey area II."

However, the description of 3206 (Table 5-19) which is abstracted from Davis' survey does not suggest what "cases" are being described and the suggestion that they are modern seems unfounded. The other coastal features referred to are those of Site 3207. This site was not relocated so no "supplementary data on... significance" were obtained. The archaeologist is relying solely on Davis' descriptions which Davis stated were incomplete for his consideration of Site 3207's significance.

Site 3209 is described (page 5-20) as "more likely a burial". No basis is given for this suggestion and it is in fact contradicted by Davis in his original report (page 19). The most likely explanation (I have myself visited this structure) seems to be that it is a Hawaiian religious structure or heiau. The final aim of the survey was to recommend appropriate action on the sites — How can this be done when the majority of features (64 percent) on the property were not re-examined? On page 6-12 where impacts on archaeological sites are discussed there is a clear attempt to minimize the importance of the archaeological features (this is also seen in the previous discussion of the sites on pages 5-18 to 5-20). Thus we read

"Some of the 64 features to be eliminated have been disturbed by modern land use and some are probably of modern origin and of no archaeological value. However there are isolated areas where small shelters, habitation sites, and miscellaneous features survive intact."

This statement is most misleading as only 15 of the 64 features have been examined by the current archaeologist and he provides no evidence to suggest modern origin and no information on how many have been disturbed by modern land use. "Isolated areas" does not square with the information provided in Davis' original survey — see for instance Complex 3210, a 3500m<sup>2</sup> area of cultivation mounds and clearings, enclosures, C-shapes and ahu (only 2 features of this complex were relocated by the Project archaeologist), Complex 3214, a 2400m<sup>2</sup> area of cultivation mounds and clearings incompletely described by Davis (and not revisited by the project archaeologist), Complex 3215, an 18000m<sup>2</sup> area of cultivation mounds and clearings with C-shapes, again incompletely described by Davis and with only the two C-shapes relocated. One need only add Complex 3216 (16000m<sup>2</sup>), 3217 (6000m<sup>2</sup>), 3218 (3200m<sup>2</sup>), none of which were re-examined, to make it clear that we are not dealing with "isolated areas" but large complexes whose significance has yet to be fully investigated. This section on impacts is completely unacceptable, especially as no indication is given that any further work in mitigation of their proposed destruction is being planned. In relation to this it is worth noting Dames and Moore's reply to Bertell Davis' letter where they state that "The horizontal distribution of the cultural materials beyond the structures is unknown, and will be assessed during construction". What does this mean? Are the construction crew the ones trained to determine site boundaries? Also misleading is the archaeological feature location map (Figure 5-6). If we compare it to the map in Davis' original report and his

site descriptions, we can see that the sites are generally much larger than indicated (see appended map). In many cases Davis noted that site delineation and description was incomplete for 22 features and a further 6 site complexes. I strongly suggest that Table 5-18 in the draft EIS be replaced by Davis' full descriptions from his report (here appended) which total only 11 pages. This would allow a better appreciation of the number and nature of the sites and their significance. Table 5-18 as it now stands is dangerously misleading.

On page 7-1 it is stated that the proposed development is in conformance with the Hawaii State Plan. In relation to the historic resources this is patently untrue particularly in relation to Sections 12 and 23 as given on pages 7-2 and 7-3.

To improve the EIS which as it stands is a seriously flawed document, I suggest the following actions.

1. An intensive survey of survey areas I, II, III (as recommended by the State Historic Preservation Officer and Bertell Davis) including a strategy to assess the extent of sites under the leaf litter. All sites there to be clearly flagged so that no further damage to them takes place.
2. Submission of a site by site consideration of archaeological significance, including possible cultural significance to Native Hawaiians and potential for interpretive significance for public display.
3. Preparation of a management plan for sites to be preserved and a plan for salvage of remaining sites with justification for these actions. Areas to be specifically addressed in considering preservation should include representativeness of sites within the project area (i.e. a range of site types should be preserved), uniqueness (in the case of Site 3209), and integrity of site complexes. There seems, for instance, to be little planning in the decision to preserve only 3201, 3202 and 3205 when they form an integrated unit around the swamp with 3203 and 3204.

Even without changing the marine configuration it should prove possible to preserve Complex 3212 or parts of it as an example of a probable agricultural complex. Other features or site areas should be considered for preservation within the marina plans and would aesthetically add to the development. As Mr. Ono stated in his letter, without more information on the sites than has been presented by the developer it is not possible to give specific recommendations at this stage, although 3209 is obviously far too significant to be destroyed. For preservation and interpretation of sites there are possibilities for Federal and State grants, as well as community involvement as has happened in the restoration of Puhia Heiau in Hawaii Kai. Clarification is needed of plans for the "preserve" area and other areas to be set aside for preservation. On page 2-2 it states "several archaeological features will be preserved and made accessible for the general public" and yet on page 4-9 we hear the "the 27.5 acre preservation area has been designated to remain in its present undeveloped condition" which would mean that it would not be readily accessible. Plans are needed for stabilization and interpretation of this and other site complexes. Otherwise the sites will deteriorate over time.

A final point which needs clarification. In the letter of Dames and Moore to DLNR of February 11, 1985 it is stated that "the wetland is brackish and does not contain

a natural freshwater source" but on page 5-7 of the draft EIS it is stated that "There are however areas where freshwater either accumulates or wells up" and the presence of freshwater insect fauna is noted. Serious consideration needs to be given therefore to the potential of this marsh for use by native Hawaiian waterbirds.

#### Summary

The draft EIS gives inadequate treatment to questions of historic preservation. No account has so far been taken of the serious questions raised by Mr. Ong, the State Historic Preservation Officer and Mr. Davis who conducted the original archaeological survey. No serious attention has been given to the possibility of preserving sites outside the arbitrarily defined preservation area. The presentation of archaeological data on the sites is misleading, inaccurate and does not come near to professional standards. Davis' original maps and site descriptions should replace those given in the draft EIS (see appended copies). Before the EIS is accepted an intensive survey and management and mitigation plans should be developed and approved by State and Federal agencies. An on-site inspection by professional archaeologists and interested parties such as the Office of Hawaiian Affairs and Historic Hawaii Foundation, as well as project planners should be organized for consultation. Meanwhile every effort should be made to protect the archaeological sites from further damage until their significance can be evaluated.

Attachment

EXTRACTS FROM THE

REPORT ON ARCHAEOLOGICAL SURVEY OF THE

PROPOSED EWA-MARINA COMMUNITY DEVELOPMENT,

EWA BEACH, OAHU ISLAND

By: Bertell D. Davis

(Attachment to letter of M. Spriggs)

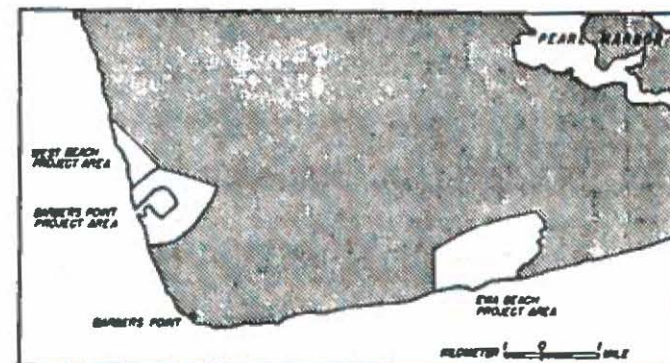


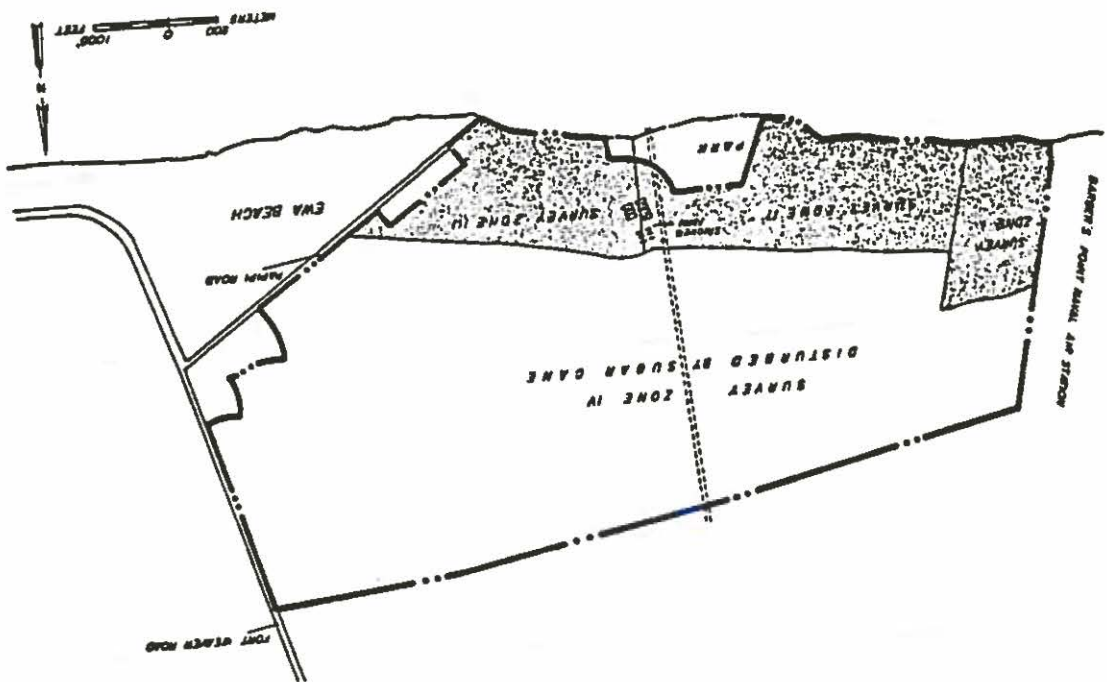
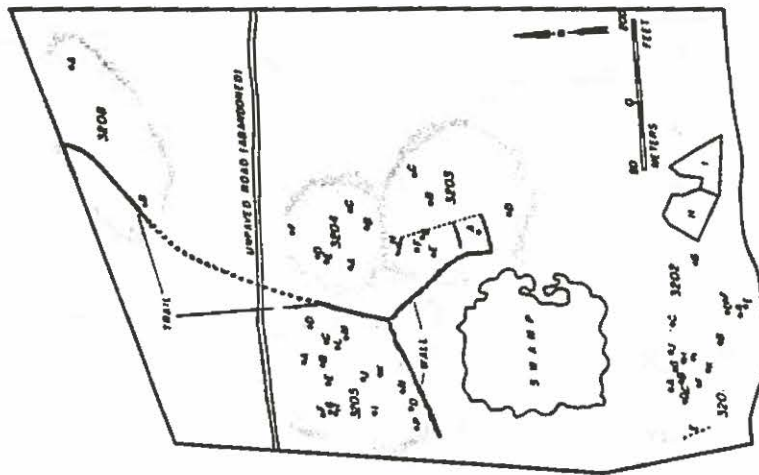
#### LIST OF FIGURES

- Figure 1. Locator map of southwestern Oahu showing location of the Ewa Beach Project Area and the Barbers Point and West Beach Project Areas.
- Figure 2. Map of the Ewa Beach Project Area showing the locations of Survey Zones I-IV.
- Figure 3. Map of Survey Zone I of the Ewa Beach Project Area showing location of archaeological features recorded by the survey.
- Figure 4. Map of Survey Zone II of the Ewa Beach Project Area showing location of archaeological features recorded by the survey.
- Figure 5. Map of Survey Zone III of the Ewa Beach Project Area showing location of archaeological features recorded by the survey.

#### LIST OF TABLES

- Table 1. Feature Descriptions of Archaeological Remains Recorded in Survey Zones I-III, Ewa Beach Project Area, Southwestern Oahu.









SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (M)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
	1	Fair		Shm			3.9	35-60			11.9		A low, sub-rectangular rim of multiple-stacked limestone rubble and small boulders; possible remnant facing with some up-right limestone slabs; top of structure roughly flat; some <i>Bulla</i> shell scattered around surface.
	2	Good		Shm	3.9	3.6		35-85			14		A moderately high, roughly rectangular rim of multiple-stacked limestone rubble and small boulders; possible remnant facing with a few up-right slabs; top of structure uneven; no surface midden observed.
	3	Good		Rectangular Enclosure	3.9	3			60-100	35-60	10.5	3.3	Habitat structure recorded as small enclosure, but similar to normal C-shape features at Harbor's Point; multiple-stacked rubble walls with up-right limestone slabs--especially interior facing; probable doorway (or open side) to southeast; some <i>Bulla</i> shell midden scattered around surface.
	4	Good		Rectangular Platform	8	4		30-50			32	32	A large elevated limestone rubble floor with remnant facing of small boulders and up-right slabs set in ground; possible extension of floor or a second lower floor (c. 20 x 40) on east side of platform; some <i>Bulla</i> shell midden scattered around surface; basalt lining stone (this wall) or discoidal hummocks on surface c. 70 to northwest.
2200			Survey Zone 1	Complex									A cluster of 9 features located between the east and the southeast corner of the camp.
	A	Good		Rectangular Platform	3.3	3		30-50			20.3	10.3	A small elevated floor of limestone rubble and multiple-stacked small boulders with remnant facing of small boulders set in place; several up-right limestone slabs apparently part of facing; fragments of "old" and recent bottle glass around surface with <i>Bulla</i> and <i>Lima</i> shell midden; possible remnants of small platform c. 3m to the west.
	B	Incomplete		Hidden Deposit	7	7		7			7		Subsurface deposit of unknown extent or depth exposed by up-root tree; dark-stained sediments include <i>Bulla</i> , <i>Cypraea</i> ( <i>cypraea</i> ?) and pearl shell ( <i>cypraea</i> ?). Fish bone and carbonized (see variable). Fire-cracked and water-worn basalt, and fragments of charcoal.
	C	Good		C-shape	3.3	3		75-100	30-60		9.9	2.2	Small, angular (2 corners) C-shaped wall of multiple-stacked rubble and small boulders with possible up-right slabs inside-facing (?); open side to the south; no surface midden observed; ground basalt overtones fragment c. 10m to the south.
	D	Good		Rectangular Platform	8	6		c. 35			48	48	Very large elevated floor of limestone rubble with probable remnant facing of multiple-stacked rubble and small boulders; three small limestone slabs possibly set into the floor on edge suggesting possible hearth; surface midden scatter includes <i>Bulla</i> and <i>Cypraea</i> ( <i>cypraea</i> ?) shells, fish bone and fire-cracked basalt.
	E	Good		Rectangular Platform	4	2.3		25-60			14	14	Small elevated limestone rubble floor with remnant facing of small boulders and some up-right slabs; possible hearth indicated by rough square rock (c. 4 cm) hole in top of feature; surface scatter includes fragments of bottle glass--pre-1900 (?), body seen with turn top, midden includes <i>Bulla</i> , <i>Cypraea</i> ( <i>cypraea</i> ?) and <i>Brachidontes</i> shell, and fire-cracked basalt.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (M)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3201			Survey Zone 1	Complex									A cluster of 12 features located between the east and the southeast corner of the camp.
	A	Good		Rectangular Platform	8	3.3		15-30			22.2	22.2	One of three adjacent platforms; a large elevated limestone rubble floor with possible low perimeter wall extending along north side and c. 2.5m beyond the west edge where the wall stands c. 60cm high and is 75cm wide at the base; shell midden around all three structures including <i>Bulla</i> , <i>Cypraea</i> , <i>Bulla</i> and <i>Cypraea</i> ; other surface debris includes some fire-cracked basalt and fragments of recent bottle glass.
	B1	Good		Rectangular Platform	4.3	3.9		15-25			15.7	15.7	Second of three adjacent platforms; a large elevated limestone rubble floor with possible low perimeter wall around four sides; base of platform faced with small limestone boulders and at least some upright slabs; C-shaped wall abutting south side of platform; surface debris same as listed above.
	B2	Good		C-shape	2.3	2.3		50-100	15-25		9.3	6	Semi-circular wall abutting southeast corner of Platform B1 and extend around south side with the open side of the enclosed floor on the west; wall built with multiple-stacked limestone boulders and rubble; surface debris as listed above.
	C	Fair		Rectangular Platform	5.7	2.7		15-25			7	10	Third of three adjacent platforms; a small elevated floor of limestone rubble, structure appears disturbed with extensive rubble around floor; perimeter of original foundation uncertain; therefore, only surviving floor area given; total area of rubble c. c. 20m; surface debris as listed above.
	D	Incomplete		Hidden Deposit				c. 10			7		Possible subsurface deposit of unknown extent or depth indicated by surface scatter, including <i>Bulla</i> , <i>Bulla</i> glass, <i>Cypraea</i> , <i>Cypraea</i> , fish bone and some fire-cracked basalt. Two of seven probably recent rock mounds across this feature.
	B1	Incomplete		Hidden Deposit	c. 30	c. 10					300		Possible subsurface deposit of unknown extent or depth indicated by surface scatter, including <i>Bulla</i> , <i>Bulla</i> glass, <i>Cypraea</i> , <i>Cypraea</i> , fish bone and some fire-cracked basalt. Two of seven probably recent rock mounds across this feature.
	E2	Fair		Shm			1.5-2.5	60-90			1.0-9.6		Seven probably recent rock mounds spaced in a straight line over c. 20m, apparently not associated with possible midden deposit above; may date to military use of the area; site range of mounds given.
	F1	Fair		Structure	10	3		60-150	20-60		30	7	Heavily disturbed structure, original shape unknown; remaining wall sections appear to be multiple-stacked rubble and possible core-filled construction; several up-right limestone slabs in what may have been interior of wall; scattered shell midden, including <i>Bulla</i> , <i>Cypraea</i> , <i>Cypraea</i> and <i>Brachidontes</i> shell; possible hearth located c. 30m southeast of this feature.
	F2	Fair		Hearth	.5	.3		7					Possible small hearth defined by three limestone slabs set on edge into the ground, two at right angles to the third; hearth situated on slight rise c. 20m which may be a remnant structure (platform).
	G	Fair		Structure	5	4.3		7	60-70		21.3	7	Heavily disturbed structure, original shape unknown; although possibly C-shape, remaining wall sections apparently of multiple-stacked construction with several up-right limestone slabs on exterior (?); wall; scattered surface midden, including <i>Bulla</i> , <i>Cypraea</i> , <i>Cypraea</i> and <i>Brachidontes</i> shell, and fire-cracked basalt and a small sherd.



SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT DEPTH (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
	B	Incomplete		Structure	0.13	0.19		25-30			0.150	?	A disturbed structure which may be a platform with an abutting C-shaped wall apparently oriented with the open side of the "C" to the southeast; original foundation and construction uncertain, although the floor of the platform area appears to be rubble and rubble fill and several upright slabs appear to indicate former facings--thus only the overall dimensions of the rubble area given. Surface debris includes some <i>Merula</i> and <i>Carya</i> shell middens; c. 1 km west is an area with several possible but very disturbed "shy" evidence only sufficient to suggest that something had once been there.
	C	Good		Alm			1.5	130			2.1		A large multiple-started limestone rubble and boulder alm with an abutting piled rubble and boulder wall at base; wall measures 150cm long x 180cm wide x 2.50m high; wall located on north side of alm; large open stables x 110cm x 150cm at the rim and x 150cm deep (to boric fill) located 5m to northeast; no surface debris observed, however, fill of stables exceeds 100cm (length of probe).
	B1	Good		C-shape	9.3	9.3		60-100	25-30		29.3	10	A large disturbed C-shaped shelter of multiple-started construction with several upright limestone slabs on inside of wall; outline somewhat angular with possibly two corners inside, open side of "C" to the southeast; surface midden includes echinoids, <i>Merula</i> and <i>Brachidontes</i> shell remains; three also located within 1m to south and west.
	B2	Good		Alm	7.3	2		60			5		Rectangular alm of multiple-started construction; facing on southeast side intact, rest of structure collapsed.
	B3	Fair		Round	2.4	2.3		40			2.9		Square rock mound with possible remnant facings--may be deteriorated alm.
	B4	Good		Alm	3.4	2.3		60			8.5		Large partially collapsed rectangular alm of multiple-started construction--possibly lined with core-filling as indicated by small boulder facing and mixed boulder-rubble interior.
	A	Incomplete		Structure	0	6.5		30-30			50.5	?	A very disturbed structure, possibly remnant platform; original foundation and construction uncertain--dimensions given only for the extent of limestone rubble; surface remains include <i>Merula</i> , <i>Carya</i> , <i>Brachidontes</i> and <i>Merula</i> shell.
	F	Good		Rectangular Platform	0.5	0		25-40			61	61	A large elevated limestone rubble floor apparently divided into two areas; main floor measures 0.5m x 0.5m, the adjacent floor measures 0.5m x 2m, the two floors are separated by a rubble and slab alignment core course (c. 15cm) high and c. 10cm wide; surface debris includes water-worn basalt cobbles, possible rough basalt flakes, pre-1700 (?) bottle glass, and <i>Merula</i> shell and fish bone midden.
	G	Good		Alm	2.4	2.7		80			7.3		A large oval alm of multiple-started construction and facing of upright slabs about two-thirds the way around; some collapsed with uneven rim and fallen rubble around base, some recent (?) bottle glass around ground surface.
	H	Good		Wall	25				300	35-65			Remnant section of large core-filled free-standing wall; portions of foundation quite clearly show large slabs set on edge with rubble fill between these parallel alignments; highest surviving point of wall at 25cm.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT DEPTH (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
	F	Incomplete		Platform			0.8	0.30			?	?	A broad (indefinite) limestone rubble and small boulder mound which appears to possibly be a deteriorated platform; no facings or alignments visible, surface consists of 19th century bottle glass, fire-cracked basalt, fragments of corroded iron, and a fragment of prehistoric bowl; no shell or bone midden observed; features B, E, and F are quite close and could be considered; another possible disturbed platform 0.1m to northeast, but this is very uncertain.
	C	Incomplete		Structure	?						?	?	Either a small platform or rather large, but low alm of roughly piled limestone cobbles and small boulders; does appear to be artificial, but not the result of building up-routed core; 1.1m east observed possible subsurface deposit of unknown extent or depth; deposit of dark-stained sediment containing fragments of charcoal, and <i>Brachidontes</i> and <i>Merula</i> shells. This feature at west end of feature H (below) and deposit may be part of feature H.
	R	Good		Garden Area	40	35					1400		A broad mass of sediment-rubble deposits interpermeated with exposed limestone bedrock; lower surface rock apparently covered from sediment extent and attached on adjacent outcrops forming a series of conical mounds; low rock mounds on surface midden observed; this feature similar to enclosure at Barber's Pond--inferred to be horticultural mounds.
	I	Good		Garden Area	30	40					1000		Same as feature R (above) of which this may just be an extension.
3703			Survey Lane 1	Complex									A cluster of 12 features located along the northeast side of the camp.
	A1	Good		Rectangular Platform	6.3	6.3		30-30			60.9	60.9	A large elevated limestone rubble floor defined on four sides by foundation of small boulders and rubble; not in place--platform and facing in excellent condition, possible alignment of boulders on floor of platform along east and south sides set a 100cm to from outside edge; surface debris includes 19th century bottle glass, a fragment of ceramic bowl, plus echinoids, <i>Styela</i> , <i>Brachidontes</i> and <i>Merula</i> shell middens; the platform is located within a large unenclosed area (see below).
	A2	Good		Enclosure	0.30	0.20			100-200	30-50	0.600		Several badly disturbed sections of former free-standing wall once enclosing an area c. 10m x 50m around Platform A1 (above); dis-urbance of wall makes assessment of construction impossible for the most part, but several sections along north side do show core-filled construction with boulder facing and rubble fill--no evidence of upright slabs; west wall of enclosure is part of a continuous (although broken) wall extending nearly half-way around the camp (218 m)--feature 3703A2 will designate all sections of this continuous wall; three mounds of piled rubble c. 2.5d x 10 m high contained within enclosure east of Platform A1; large depression c. 2m in southeast corner of enclosure indicates possible presence of filled-in stables, or perhaps an inn (north even).

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
	A1	Fair		C-shape	4	4		7	30-	30	16	1	Poorly preserved C-shaped wall abutting Feature A1 (above) and oriented with open side to southeast; little surviving wall section appears to be multiple-stacked construction; original foundations uncertain; therefore, only overall dimensions given.
	B	Good		Rectangular Enclosure	12	7		75-150	30-	45	64	6.26	A large two-room enclosure of multiple-stacked construction and some up-right limestone slabs in exterior and interior facings. Structure oriented with doorway to each room on west side; floor of west room c. 10cm. floor of east room c. 10cm; probable slab-lined hearth (c. 30 x 40cm) located in west room near doorway; a recess (60cm long x 30cm high x 30cm deep) located in exterior face of south wall fragments of filling shell only surface midden observed.
	C	Fair		Structure			6	70-100	25-	45	20.3	12	Disturbed structure which appears to be two or three adjoining C-shaped shelters--overall dimensions c. 10m x 6m. best preserved C-shape (dimensions given at left) of multiple-stacked construction with a few up-right limestone slabs; open side of shelter to the south; surface debris includes: <i>Perilla</i> , <i>Crucian grasshopper</i> , <i>Burris</i> , pearl shell ( <i>Littorina</i> ?) and <i>Littorina</i> shell, and fish bone midden.
	D	Incomplete		Structure			3.3	60-70	20-	30	9.6	3.7	Another possible series of adjoining C-shaped shelters--overall dimensions c. 10m x 6m. best preserved C-shape (dimensions given at left) of multiple-stacked construction with several exterior up-right slabs; open side of "C" on the southeast; no surface midden observed; several low rock mounds (average 2nd x 30cm high located c. 4m to southeast).
	E	Good		Alm	6	4		60-100			24		Large roughly rectangular rim of multiple-stacked construction; partially enclosed, but facing on south side intact; surface debris includes rusted cans, rifle cartridges, beach sand (from military sand bag?), and <i>Burris</i> shell.
	F	Good		Rectangular Enclosure	4.6	3.8		90-110	60-	30	17.3	6.1	A walled enclosure of multiple-stacked construction with a few up-right limestone slabs; probable doorway on west side; apparently disturbed by military activity as indicated by communications wire and old beer bottles; no surface midden observed.
	G	Good		Alm			2.7	60-70			3.7		Large circular rim of multiple-stacked construction with generally well preserved facing of small boulders and up-right limestone slabs; sides straight and slightly sloping up to roughly flat top; slight depression in top of feature suggesting possible interior cavity; small irregular basalt hammerstone found on ground at base of rim; no surface midden observed.
	H1	Fair		C-shape	3.5	3		60-80	30-	40	10.3	3.6	A somewhat angular C-shaped wall with two probable doorways in east wall section; open side of "C" to southeast; wall built with multiple-stacked limestone boulders and small boulders; no surface midden observed.
	H2	Incomplete		Round							7		Several large rock mounds (ca. 2nd) and other smaller mounds located in poorly delineated area 3-10m west of features F, G, and H1; possible cultivation (?) mounds.
	I1	Good		C-shape	3.2	2.3		60-70	35-	45	7.4	3.3	A small C-shaped shelter wall with at least one corner to back wall; open side of "C" to southwest; wall built with multiple-stacked limestone boulders and possibly using up-right slabs which have since collapsed; surface debris includes: <i>Perilla</i> and <i>Burris</i> shell, and fragments of wire.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3204	A	Fair	Survey Zone 1	Complex Rectangular Enclosure	3	3			1	25-35	35	1	A cluster of 7 features located on north side of camp.
	B	Fair		C-shape	4.3	2.3		75-100	30-	45	11.3	3.0	A large roughly rectangular but disturbed structure; apparently multiple-stacked construction with up-right slabs on exterior facing; interior finer indeterminate and location of doorway uncertain; surface debris includes herbed wire fragments and a fragment of basalt with circular ground polished facets; apparently numerous stacked rock mounds (average size c. 2nd x 10cm high) to immediate south of this feature; wall 120cm also passes on 10m south of structure.
	C1	Good		C-shape	4.7	4.3		100-130	30-	50	18.3	6	A badly disturbed structure of apparently multiple-stacked construction; several up-right limestone slabs suggest interior facing of wall; structure has at least two walls meeting in a right-angle corner with the open side to the west, although the wall may have extended to this side and then disturbed by growth of a quite large banyan tree (a circumstance identified in a similar feature--714--at Barber's Point); only surface debris observed was a fish of volcanic glass.
	C2	Fair		Alm			1.3	65			4.1		A large C-shaped shelter of multiple-stacked construction with interior facing of up-right limestone slabs; summit exterior facing of up-right slabs suggests higher wall sections may have also been in part core-filled; open side of shelter to southwest; no surface debris observed; probable also located on southeast side of shelter.
	D	Good		Triangular Enclosure	6.5	6		80-120	50-	75	34.4	14.3	Circular rim of multiple-stacked construction with some interior facing (?) including several up-right limestone slabs around north and east sides; top of structure unknown.
	E	Good		Triangular Enclosure	6.5	6		80-120	50-	75	34.4	14.3	A large somewhat triangular walled enclosure; walls of multiple-stacked construction with some sections apparently core-filled; several up-right limestone slabs on interior; two openings in wall--one on north side is clear of any rubble suggesting the breach resulted from collapse but the opening lacks a formal "flathead" appearance; the other opening on the southwest side does have the squared-off wall end on one side but the other side is disturbed and there is rubble in the opening; surface debris includes fragments of herbed wire and quantities of charcoal; no shell or bone midden observed.
	F	Incomplete		Structure	8	4		50-100	35-	45	32	1	Possibly three walled wall sections of mixed small boulders and rubble with several up-right limestone slabs; original shape unknown although two of the "walls" do form a C-shape with the open side to the southwest; no bone or shell midden observed.
	G	Incomplete		Structure	4.2	2.3		75-100	35-	45	9.7	1	An apparent multiple-stacked C-shaped wall oriented with the open side to the east; wall built with rubble and small boulders but no clear facing; no bone or shell midden seen.
3202	A3	Good	Survey Zone 1	Complex Rectangular Enclosure	3	3			1	45-65	73	1	A cluster of 20 features located on north side of camp and west of Site Camp 3204.
													A large walled enclosure of multiple-stacked construction with several up-right limestone slabs in exterior facing; walls deteriorated with rubble filling enclosed interior foundation and floor area indeterminate; probable C-shaped wall abutting on southeast and opening door way on southeast side; <i>Burris</i> shell only surface midden observed.



SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3294	A	Fair	Survey Zone II	Complex									A cluster of 4 features located behind the beach and east of Site Complex 3293.
				Rectangular Enclosure	0	4		60-120	35-65		37	15	A disturbed, roughly rectangular walled enclosure of multiple-stacked construction with some possible up-right limestone slab facing east wall badly exposed; but no clear evidence of doorway in other walls; extensive surface scatter of <i>Callina</i> , <i>Latia</i> , <i>Harila</i> , <i>Cypraea</i> , <i>Stomatopora</i> , <i>Conus</i> and <i>Tellina</i> shell debris, other surface debris includes recent trash, historic (pre-1900?) bottle glass, and shards of brownish lantern glass; historic wall with masonry stone wall surrounding a natural sinkhole (with standing water) located c. 50m to the east.
	B	Fair		Rectangular Platform	7.1	3.7		30-40			36.9	34.9	Large elevated floor of small boulders and cobbles defined in part by facing of multiple-stacked construction; possibly with some up-right limestone slab; natural sinkhole (c. 1.1 and a 19?) on floor with standing water located 3m to southwest; extensive surface scatter of large and <i>Harila</i> shell; and possibly fire-cracked basalt cobbles; one light of volcanic glass collected from surface on west side of platform.
	C	Fair		C-shape	9.3	4.5		60-150	30-80		22.3	11	Large disturbed C-shaped wall of multiple-stacked construction with several up-right limestone slabs, open side of structure towards the southeast; adjacent sand bank dark with probable charcoal staining; masonry <i>Stomatopora</i> shell only surface midden observed.
	D	Incomplete		Wall	3			?	?				Segment of free-standing, curve-filled wall oriented perpendicular to the coast; located just behind the beach and a 40m west of Feature 3294C.
3297	A	Incomplete	Survey Zone II	Complex			4.4		60-100	20-80	27.2	15.4	A cluster of 4 features located behind the beach and east of Site Complex 3294.
				C-shape									Large C-shaped wall of multiple-stacked construction with open side to the south; barbed wire fence on west side of structure; no surface midden observed.
	B	Incomplete		Structure	5.5	3.1		65-80	20-50		20.1	20	Possible disturbed rectangular platform--appears to be an elevated floor of small boulders and cobbles with a raised wall (?) on the north and west sides; no surface midden observed, except for recent trash.
	C	Incomplete		Structure	3.7	2.4		60-80	20-50		8.9	3.4	Possible disturbed C-shaped or oval enclosure of multiple-stacked construction; no surface midden observed, except for recent trash.
	D	Incomplete		Structure	3	2.4		40-50			7.2		Possible remnant one or small platform of multiple-stacked construction, remnant facing (?) of up-right limestone slab in northwest corner; no surface midden observed.
3298	A1	Good	Survey Zone I	Complex			3		30-60	40-50	7.1	3.7	A cluster of 4 features located at the northern edge of Survey Zone I.
				C-shape									A C-shaped shelter wall of multiple-stacked construction; open side of "C" on the southeast; no surface midden observed except for bottle May II vintage bottle glass--this and orientation of wall suggests possible recent date for this structure.
	A2	Good		C-shape			2.5		30-60	40-50	4.9	2.3	Same as Feature 3298A1, except open side is towards the east.
	B	Good		Alt	3	2		35-60			6		A large oval rim of stacked limestone cobbles and small boulders, slight depression in top of structure; no surface midden observed.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
	I2	Fair		Round	1.6	3.5		40-45					A low stacked boulder and cobble mound with a central cavity c. 60cm x 20cm x 40cm deep from top of feature; no surface midden observed.
	J	Good		Triangular Enclosure	6	3.3		100-130	35-50		27.3		Triangular or sub-rectangular walled structure of multiple-stacked construction; possible doorway on east side; surface debris includes continuation of wire, wood slats (bamboo), and <i>Harila</i> shell midden.
	K1	Incomplete		Structure	6	3		?	30-35		18	?	Badly disturbed multiple-stacked wall of small boulders and what appears to be the remains "interior" facing formed with up-right limestone slabs; original shape and position of foundation stones uncertain; but structure may have been a C-shaped shelter; no surface midden observed, overall limestone given.
	K2	Fair		Alt	4	2		4-60			8	7.0	Rectangular rim of multiple-stacked construction with small boulders and cobbles.
	L	Incomplete		Structure	7	5.3		?			36.5	?	Badly disturbed structure appears to have possibly been a platform; original shape and foundation uncertain; surface scatter of <i>Harila</i> shell observed; overall limestone given; roughly rectangular rock mound (c. 30 x 30 x 20-40cm high) located c. 6m to west of this feature.
	M	Good		Rectangular Enclosure	4.5	3.9		90-120	30-50		17.4	4.3	Walled enclosure of multiple-stacked construction with interior facing of up-right limestone slabs; somewhat wide (c. 120cm) doorway in southwest corner; surface debris includes <i>Latia</i> , <i>Harila</i> , and <i>Stomatopora</i> shell midden.
	N	Fair		Triangular Enclosure	7	4.3		110-130	40-70		40	?	A roughly triangular walled enclosure, badly disturbed with only sections of exterior facing in place--most on east side; extent and shape of interior floor uncertain; construction apparently largely multiple-stacked cobbles and small boulders with some up-right limestone slabs; one large slab (c. 100cm x 10cm x 15cm thick) "flushed off" end of wall at probable doorway in northeast corner of structure; a discoidal abraded oval artifact found in the doorway; a discoidal shaped hammerstone or possibly unfinished gaming stone (also called) of volcanic basalt also found on the surface; no surface midden observed; continuation of long wall--Feature 3298A1--circling ramp located c. 5m south of this feature.
	O	Good		C-shape			4.4-5		100-110	30-60	16.6	10	The remnant (half?) of well-built core-filled C-shaped wall with interior and exterior facing of up-right limestone slabs; size and area dimensions given no estimate of original structure; one end of remnant "flushed" indicating the open side of the structure towards the west; surface debris includes <i>Latia</i> , <i>Harila</i> , and <i>Tellina</i> shell midden; continuation of wall--Feature 3298A1--c. 40m south of this feature.
	P	Fair		Structure	7	4		15-25			28	?	A very disturbed rectangular structure--either a platform or possibly a level enclosure (Feature 1 near perimeter fence of Harbor's Point Naval Air Station); construction type uncertain, but surviving facing of southeast corner consists multiple-stacked of cobbles and small boulders with some up-right limestone slabs; extensive surface midden includes <i>Stomatopora</i> , <i>Harila</i> , <i>Cypraea</i> , <i>Stomatopora</i> , <i>Brachidontes</i> and <i>Tellina</i> shells; continuation of wall--Feature 3298A1--located c. 10m south of this feature where the wall begins curving back towards the east around the west side of the ramp--wall ends at perimeter fence of the NAAS where it has been destroyed by recent construction on the air base.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT DEPTH (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3211	A	Fair	Survey Zone III	Complex									Two C-shaped shelters located in the northeast corner of Survey Zone III.
	B	Fair		C-shape	3.3	1.7			0.40	30-40	8	3.3	C-shaped wall of multiple stacked construction; open side of "C" towards the southeast; no surface midden observed.
3212			Survey Zone III	Complex									A cluster of 6 features in the northeast corner of Survey Zone III.
	A	Good		Rectangular Platform	6.3	3.3		55-90			13.1	13.1	An elevated rectangular floor of small limestone boulders and cobbles with relatively high multiple-stacked facing; slight depression in center of floor; given height of nearly 1 m, this may be a rather large one; no midden observed on the surface; although measurements are different, this may be Bishop Museum Site 1 (Jourdane 1979:3).
	B	Good		Wall	0.3				0.133	0.30			Remnant of multiple-stacked, free-standing wall; no surface midden observed.
	C	Good		Rectangular Enclosure	3.2	4.0			90-130	30	25	9.3	Large walled enclosure of mixed core-filled and multiple-stacked construction with some interior and exterior facing of up-right limestone slabs; possible doorway in northwest wall; an amorphous rubble mound (fire-cracked limestone?) c. 3m <sup>2</sup> in area adjacent to southeast corner--slight depression (c. 2m x 0.5m deep) in mound suggests possibility of an imp. or earth oven; surface debris includes <i>Peridroma</i> , <i>Cyrtus</i> , <i>Gemma</i> , <i>Stachys</i> , and <i>Trifolium</i> shell; also lower midden; this comes to be Bishop Museum Site 1 (Jourdane 1979:3).
	D	Good		Wall	30				0.60	40-50			Section of free-standing, multiple-stacked limestone boulder wall with occasional up-right slabs; no surface midden observed.
	E	Good		Altar	1	2		0.60					Large rectangular rim of multiple-stacked construction with small boulder facing and mixed boulder/cobble fill; broken bottles only surface debris observed.
3213			Survey Zone III	Complex									A cluster of 13 somewhat oval rock mounds ranging in size from 1 m x 0.5 m to 2 m x 1 m and from 30 cm to 1.5 m high; the mounds are piled up on limestone outcrop adjacent to deposits of bulk sediments from which the rock for the mounds was taken; this feature is quite similar to those at Barber's Point inferred to be horticultural features; no surface midden observed.
	A	Fair		C-shape	7.7	0.3			90-130	30-70	37.2	22.1	Very large C-shape, east side of Zone III, multiple-stacked wall built of limestone cobbles and small boulders with open side towards east; apparent accumulation of sand on interior floor; no surface midden observed.
3214			Survey Zone II	Complex									Extensive area of probable cultivation mounds and clearings west of Site 3209; as with Site Area 3210, overall data incomplete; at least 1 enclosure and a C-shaped structure were located; specific data available for C-shape only.
	A	Fair		C-shape	2.3	1.9			30-100	40-90	4.4	1.2	A somewhat angular C-shaped shelter wall of multiple-stacked construction with several up-right limestone slabs at ends of wall on open side; open side towards the north; no surface midden observed--however, evidence of extensive flooding from overflow of drainage ditch to north.

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT DEPTH (CM)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3209	C	Good	Survey Zone II	Trell		75-1.0							Sections of a probable historic trell extending from area of Site Complex 3208 south towards the open parking between Site Complexes 3204 and 3203; in that area the trell apparently runs through the wall--Feature 3203A--surrounding the ramp. Trell is destroyed or torn down just beyond that wall; north section of trell c. 2m west of Feature 3208A, south section of trell c. 12m east of Feature 3203B.
	A	Good		Rectangular Platform	8	6		160-175			64	32.9	Two features located at northern edge of Survey Zone II and east of drainage ditch.
3210			Survey Zone II	Complex									A very large, square, two-tiered platform built on limestone outcrop which forms the lower tier; although main structure considerably collapsed with the rubble burying most of the outcrop, exposed section on east side has apparently been paved and the edge faced with multiple-stacked rock to form a more regular foundation for the main structure; bedrock foundation c. 30m high; main unit of platform is approximately centered on the foundation and measures 3 m x 3 m; it is multiple-stacked construction using large and small limestone boulders and rubble fill to even out a generally flat top; there is a slight depression (c. 15cm x 25cm deep) in the top center; a ditch (c. 35cm wide x 10cm high) is built into the base (has collapsed from) the east side c. 125m deep; two large (c. 100cm x 30cm x 25cm thick) up-right slabs are set along the south face of the ditch suggesting the structure may have been enlarged upon after initial construction; no surface midden observed--there is, however, evidence of considerable flooding from overflow of a nearby drainage ditch.
	B	Fair		C-shape	3	3.2			40-100	30	10	9.6	Large angular C-shape with two corners in rear wall; open side towards southeast; multiple-stacked construction; no surface midden observed--however, some extensive flooding as around Platform A above.
3210			Survey Zone II	Complex									An area of probable cultivation mounds and clearings located in the northeast corner of Survey Zone II to the east of Site 3209 and west of the chicken farm; overall data level incomplete for this site; at least 1 enclosure, 4 C-shapes and 7 altars were recorded in this area, but specific information limited to grave pits, morphology and (in 2 features only) presence or absence of surface midden.
	A	Fair		Rectangular Enclosure	3.4	3			50-60	20-35	10.3	4.6	A small rectangular enclosure of multiple-stacked construction with apparent interior facing of up-right limestone slabs; narrow doorway (c. 75 cm wide) in southeast wall; no surface midden observed.
	B	Incomplete		C-shape	3	3.3			40-70	15-40	13.3	0.4	A C-shaped shelter wall of multiple-stacked construction with open side towards northeast; no surface midden observed.
	C	Incomplete		C-shape	3.2	4.3			90-150	40-65	10.3	7.4	A C-shaped wall of multiple-stacked construction; orientation unknown.
	D	Incomplete		C-shape	3.9	3.3			60-70	30-90	10.7	4.3	A C-shaped wall of multiple-stacked construction; orientation unknown.
	E	Incomplete		C-shape			3.6		0.70	1	9.1	4.6	A C-shaped wall of multiple-stacked construction; orientation unknown.
	F	Fair		Altar	2.4	1.8		90					Rectangular rim of stacked boulders and cobbles.
	G	Fair		Altar	3.4	3.3		75				11.9	Rectangular rim of stacked boulders and cobbles with slight depression in top.



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December 4, 1985

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Environmental Center  
University of Hawaii  
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Honolulu, Hawaii 96822

Attention: Ms. Jacqueline N. Miller  
Acting Associate Director

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Ms. Miller:

Thank you for reviewing the Draft EIS. We have received your letter of November 7, 1985 and offer the following response to your comments.

## General Comments

Impacts associated with residential and commercial development were discussed in the programmatic EIS for the Ewa Marina Community, February 1981.

## Project Description and Alternatives

A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina, including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II. Nutrient content of the groundwater flowing into the marina will also be considered.

## Proposed Marina and Waterways

The appropriate engineering design provisions will be made where the coral is susceptible to erosion. Annual maintenance of the marina shoreline will take place.

Wave absorbers in the form of rip-rap shoreline sections are shown in Figure 4-10 of the Draft EIS. They were designed to limit the height of waves

SITE NUMBER	FEATURE	CONFIDENCE LEVEL OF DATA	LOCATION	FEATURE TYPE	LENGTH (M)	WIDTH (M)	DIAMETER (M)	HEIGHT (M)	WALL WIDTH (CM)	WALL HEIGHT (CM)	TOTAL AREA (M <sup>2</sup> )	FLOOR AREA (M <sup>2</sup> )	REMARKS
3215		Incomplete	Survey Zone II	Complex	100	100					10000		Another extensive area of probable cultivation mounds and clearings located to the west of Site 3214 and to the east of Site 3206, within the general level of data is incomplete for this complex; at least 1 enclosure, a C-shaped wall, and on the west side within the complex, but specific information limited to the C-shape.
	A	Fair		C-shape	4.2	3			60-100	30-55	10.2	9.4	Deteriorated C-shaped shelter of multiple-stacked construction, apparently with some interior facing of up-right limestone slabs; open side of shelter towards the north-west; no surface mounds observed.
	B	Fair		C-shape	3	3.2			70-80	50-60	14	8.8	A C-shaped shelter wall of multiple-stacked construction and apparently some core-filling in back wall, also running interior facing of up-right limestone slabs; open side of shelter to southeast; no surface mounds observed.
3216		Incomplete	Survey Zone II	Complex	200	80					16000		An extensive area of probable cultivation mounds and clearings to the northeast of Site 3215; the overall data level in this complex is again largely incomplete; at least 1 free-standing wall partially enclosing some of the garden features, a platform, and two C-shaped walls were noted in the area, but data available only for the C-shapes.
	A	Fair		C-shape	8	3.7			110-200	30-70	10.5	8.6	A C-shaped wall of largely piled rock with some multiple-stacked rubble and small boulders; open side of structure to the north; no surface mounds observed.
	B	Good		C-shape	3.3	3.3			90-120	30-60	19.3	10.6	Apparently a remnant of a large angular C-shape or possible enclosure—only northwest and southeast walls with the north corner surviving; walls of multiple-stacked construction with some interior facing of up-right limestone slabs; scattered surface mounds include shells and coral shell.
3217		Incomplete	Survey Zone II	Complex	c.120	c.90					8000		Another extensive area of probable cultivation mounds and clearings to the north of Site 3216; overall data level incomplete for this area; at least 1 enclosure, a C-shaped shelter, and 7 free-standing wall sections were noted within the complex, but specific information available for only one of the enclosures.
	A	Fair		Rectangular Enclosure	4.8	4.2			70-120	15-60	20.2	11.5	Remnants of a probable rectangular enclosure of multiple-stacked construction with interior facing of several up-right limestone slabs; position of some unknown; no surface mounds observed; however, evidence of extensive flooding around structure.
3218		Incomplete	Survey Zone II	Complex	c.100	c.32					3200		An extensive area of probable cultivation mounds and clearings northwest of Site 3217; overall level of data incomplete for this complex; at least 1 modified enclosure and a C-shaped shelter noted among the garden features; specific information given for the C-shape only.
	A	Good		C-shape	3.1	3.3			100-120	30-50	15.6	7.8	A disturbed C-shaped shelter wall of multiple-stacked construction with masonry interior facing of up-right limestone slabs; open side of structure towards the west; surface debris includes corals, pearl shell (Larynx?) and fishing shell mounds, and apparently fresh (not lithified) fragments of coral.

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reaching mooring areas to one foot or less. Design reflection coefficients for porous rubble on flat slopes ranged from 0.1 to 0.4 for wave periods of 10 to 15 seconds.

Hydraulic models are of limited value in studies of marina flushing (because they do not correctly reproduce turbulent mixing and wind-generated currents). A model could be used to measure resonance effects, but it is much cheaper and sufficiently accurate to do this by numerical calculation.

### Jetties

Jetty design was based on resisting an appropriate wind wave, and not on overtopping or currents due to a 100-year tsunami. In the event of a tsunami, there may be damage to the jetties which will require repair.

### Littoral Drift

The marina engineers, Moffat and Nichol, are not aware of any mechanism by which there could be a continuous net loss of sand from the project shoreline.

### Marina Construction Procedure

We are aware of damages that have occurred to homes due to blasting at Barbers Point Deep Draft Harbor. The exact nature and reasons of blast damage at Barbers Point is not clear; however, the effect has been realized. At the current EIS level of effort, the exact method of channel dredging has not yet been determined and will probably change depending on the capabilities of the contractor. Therefore, our response to your concern can only address the following:

1. If blasting is utilized, the design specifications shall include a blast plan indicating the spacing of the blast holes, the size of the charge, and the detonation patterns.
2. There will be a test program to validate the blast plan. The test program will utilize sensitive vibration monitoring equipment so that the blast plan can be validated or modified before it is implemented. During the test program, the severity of vibrations on residential structures can be quantified. In the event of a definite necessity of excavating hard coral too close to the residential area, the construction specification may prohibit the use of blasting. In such cases, coral excavation can proceed by using hydraulic hoe rams or hydraulic splitter techniques.

The final EIS will mention the blast program.

### Drainage into Marina

Calculation of fresh-water infiltration into the marina will be evaluated during the hydrogeological study.

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### Marina Maintenance

The continuous management and long-term maintenance of the marina will be the responsibility of the marina owner, indefinitely. In addition, a marina boat owners association will be incorporated to manage maintenance activities.

### Public Utilities

Recognition of solar energy potential has been included in the Final EIS.

### Alternative Marina Configurations

The alternative of housing without the marina has been more fully developed.

### Archaeology

An Archaeological Mitigation Plan recommended by the Department of Land and Natural Resources (DLNR) has been incorporated into the Final EIS. DLNR's comments on the EIS and our response to their comments are enclosed. Further research will be conducted on the archaeological features to be impacted.

In reference to your comments on Archaeology, please refer to the enclosed letters.

In addition, the material appended to your letter, "Extracts from the Report on Archaeological Survey of the Proposed Ewa Marina Community," will be incorporated into the Final EIS.

The developer is currently working with the State Historic Preservation Officer to formulate a plan for preserving Site 3209A. This will be mentioned in the Final EIS.

### Hydrology

The hydrogeological investigation will include a study of the effect on the caprock aquifer from intrusion of salt water and seepage of fresh water.

### Tsunami

Appendix B has been corrected to state that the 1946 and 1960 tsunamis did not produce bores along the Mamala Bay shoreline.

The excitation for a tsunami computation should be a water surface record measured in the ocean opposite the jetty gap. Such a measurement is not available at Ewa, and so the Honolulu record was used. It is not appropriate to scale up the Honolulu amplitude to match the 9-foot runup observed at Ewa; the beach runup would have been substantially higher than the ocean amplitude. Since the actual excitation could have been somewhat higher at Ewa than at Honolulu, it would be reasonable to apply a factor of safety -- say 2.0 -- to the computed runup heights. This would raise the tsunami inundation



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Page 4

**Dames & Moore**

elevation to +15 (MLW datum) at the upper end of the main channel (Kaloi Gulch crossing) and slightly increase the width of the strip along the channel banks that is subject to flood hazard.

Yours very truly,

DAMES & MOORE



Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)

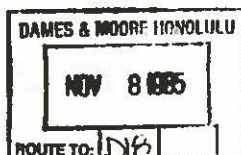
Attachments: DLNR letter, 13 November 1985  
Dames & Moore letter, 4 December 1985



## University of Hawaii at Manoa

Water Resources Research Center  
Holmes Hall 283 • 2540 Dole Street  
Honolulu, Hawaii 96822

5 November 1985



Mr. John P. Whalen, Director  
Department of Land Utilization  
City & County of Honolulu  
650 South King Street  
Honolulu, HI 96813

Dear Mr. Whalen:

SUBJECT: Draft Environmental Impact Statement, Increment II, Proposed  
Ewa Marina Community, Ewa, Oahu, Hawaii, September 1985

We have reviewed the subject DEIS and offer the following comments:

- (1) On a land-short island much in need of additional housing, as documented in this EIS (p. 6-1), it is senseless to convert usable well-drained land into water as the marina would do. How much more housing can be built if the marina is not put in? One short paragraph (p. 4-15) is hardly an adequate appraisal of the effect of eliminating the marina. As presented in this EIS, the alternative of eliminating the marina and the building of additional housing thereon, has been perfunctory. It is a reasonable, viable and practical alternative deserving full disclosure of its merits and demerits. This EIS is probably inadequate without it. Hawaii Kai and Enchanted Lakes have marinas, but both were created from marshes which in essence developed well-drained usable lands from poorly drained ones.
- (2) The EIS does not address the effect that increased salt water intrusion, attributable to the marina, will have on the water quality of the caprock aquifer. Presently Oahu Sugar Co. pumps about 25 million gallons per day from this aquifer. An increase in salinity could be detrimental.
- (3) It is noted that the marina shoreline will not be lined. Coral rock is full of holes, unlike concrete slabs; therefore, it appears very questionable that the coral will give adequate protection particularly as time goes on.
- (4) Waste and sewerage facilities for the boats is not addressed. What provisions will there be for their sanitary disposal?

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- (5) Reduction in infiltration and subsequent increase in runoff attributable to urbanization needs to be addressed. The off-site siltation and retention basins upstream from this development will have no effect on the increased runoff on-site.

Thank you for the opportunity to comment. This material was reviewed by WRRC personnel.

Sincerely,

*Edwin T. Murabayashi*

Edwin T. Murabayashi  
EIS Coordinator

ETM:jm

cc: J.J. Kleveno, Dames & Moore



## Dames & Moore



1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3385  
Cable address: DAMEMORE

December 4, 1985

Water Resources Research Center  
University of Hawaii  
2540 Dole Street  
Holmes 283  
Honolulu, Hawaii 96822

D18

Attention: Mr. Edwin T. Murabayashi  
EIS Coordinator

Dear Mr. Murabayashi:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of November 5, 1985 and offer the following response to your comments.

1. Rather than construct additional houses, the developer has decided to provide mooring for 1,600 recreational vessels and provide other recreational activities.
2. A hydrogeological study of the Ewa Marina vicinity is currently being conducted to describe the existing conditions of the caprock aquifer and to evaluate the projected changes to the aquifer with installation of the marina, including the effect of salinity on existing wells. This study was requested by the Army Corps of Engineers and will be included in their EIS for the Ewa Marina Community, Increment II.
3. The appropriate engineering design provisions will be made where the coral is susceptible to erosion. Annual maintenance of the marina shoreline will take place.
4. Vessels will be prohibited from discharging waste into the marina, and at least one pump-out station will be provided at a convenient location in one or more of the public mooring areas. This sentence has been added to the EIS.
5. Greenbelts, parks, and drywells will be utilized to their maximum capacity to reduce infiltration and subsequent runoff. The Drainage Master Plan for the Ewa Marina Community has been approved by the City and County of Honolulu, Department of Public Works.

Yours very truly,

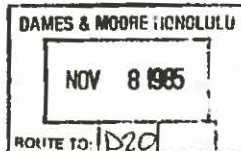
DAMES & MOORE

Jennifer J. Kievena  
Assistant Environmental Scientist



COPY

November 4, 1985



TO: JOHN P. WHALEN, DIRECTOR  
DEPARTMENT OF LAND UTILIZATION

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER  
BOARD OF WATER SUPPLY

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR EWA MARINA  
COMMUNITY INCREMENT II

We have the following comments on the environmental document:

1. The projected water demands noted on page 6-14 should be consistent with those in Tables 4-2 and 4-3.
2. On page 4-11, the document should note that we have deferred development of the Waiau Springs project.
3. On page 4-11, the statement relating to well developments in Waianae-Makaha should indicate that excess water from the Pearl Harbor District which is not needed for the Waianae-Makaha area will be available for the project.
4. The potential location of the non-potable source to be used for irrigation should be mentioned in the last paragraph of page 4-11.
5. The section on Geology and Soils (page 5-4) should be explicit in indicating whether the Koolau basalt underlies the project area.
6. On page 5-5, the section on Groundwater should indicate that:
  - a. The 1,000-foot deep test holes drilled by the University of Hawaii at Ewa Beach encountered seven (7) sedimentary aquifers.
  - b. The basal aquifer at the project area is almost all seawater.



COPY

Mr. John P. Whalen  
Page 2

November 4, 1985

7. Also on page 5-5, the difference between the use of the phrases "coral aquifer" and "marine sediments" should be clarified. Coral is a marine deposit.
8. The phrase "thin lens of brackish water" on page 5-6 should be rephrased. Brackish water is the interface between the fresh water lens and the seawater. It should also be noted that the brackish water is heavily used for irrigation of sugar cane.
9. One impact that should be mentioned on page 6-2 is that salinities in the coral aquifer may increase and may extend almost a mile inland due to the marina construction.
10. The Water Master Plans for both the off-site and on-site water improvements have been approved by the Board.
11. We are currently working with Department of Land and Natural Resources to develop part of the 22.5 million gallons per day (mgd) of permitted use available in the Pearl Harbor Ground Water Control Area for developments planned in the Ewa Plain such as the Ewa Marina Community. The Board was allocated a permitted use of 2.0 mgd to drill new wells at Honouliuli. The source will be used for the Ewa Plain developments. We are presently working with Campbell Estate to drill additional wells in the Honouliuli area for the proposed development.

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,

KAZU HAYASHIDA  
Manager and Chief Engineer

cc: Dames & Moore (Ms. Kleveno)



**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3585  
Cable address: DAMEMORE

December 4, 1985

Board of Water Supply  
City and County of Honolulu  
630 South Beretania Street  
Honolulu, Hawaii 96813

Attention: Mr. Kazu Hayashida  
Manager and Chief Engineer

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Dear Mr. Hayashida:

Thank you for reviewing the Draft EIS. We have received your letter of November 4, 1985 and offer the following response to your comments.

1. We have changed the projected water demands on Page 6-14 so that they are consistent with those on Table 4-2 and 4-3.
2. On page 4-11, we have noted that the development of the Waiau Springs project has been deferred.
3. On page 4-11, under 4.6.2 c. we have added the following sentence: "The Board has indicated that excess water from the Pearl Harbor District which is not needed for the Waianae-Makaha area will be available for the project."
4. A figure has been included in the Final EIS showing the locations of the proposed non-potable wells.
5. The section on Geology and Soils has been changed to indicate that the Koolau basalts underlie the project area.
6. The section of groundwater has been revised to indicate that:
  - a. 1,000-foot deep test holes drilled by the University of Hawaii at Ewa Beach encountered seven sedimentary aquifers.

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**Dames & Moore**

Board of Water Supply  
December 4, 1985  
Page 2

- b. At the project area, the basal aquifer consists almost entirely of salt water.
7. The discrepancy between "coral aquifer" and "marine sediments" has been clarified.
8. The phrase "thin lens of brackish water" has been changed to "thin lens of fresh to brackish water."
9. The following sentence appears in Section 6.1.2 of the Final EIS:

Construction of the marina would have the effect of moving the shoreline inland approximately 5,000 feet, thus increasing salinities in the coral aquifer.

Yours very truly,

DAMES & MOORE

Jennifer J. Kleveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)

ENV 2-1  
NV/G

M



Brenner Munger, Ph.D., PE.  
Manager  
Environmental Department  
(808) 548 6880

October 22, 1985

Mr. John P. Whalen, Director  
Department of Land Utilization  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

Dear Mr. Whalen:

Subject: Draft Environmental Impact Statement for Proposed Ewa Marina  
Community - Increment II

We have reviewed the above subject and have the following comments:

1. Paragraph 4.6.2 Water Supply - Presently, the Waiau Power Plant's well water is no longer a source for the BWS.
2. Paragraph 4.6.6 on Pages 4-13 and 4-14

The 46 kv lines will emanate from the vicinity of HECO's Ewa Beach and Honouliuli Substations to the new proposed substation site. The statement on annual consumption is not correct. HECO depends upon load data supplied by the developer and not vice versa. The electrical requirements for the development need to be confirmed by HECO System Planning.

3. Paragraph 5.13 Public Utilities

- a. There is an Ewa Beach Substation rather than a Fort Weaver Substation.
- b. Technically, electricity is not generated at a substation.
- c. The 12 kv circuit is a distribution circuit rather than a transmission circuit.
- d. The location of the existing 12 kv and 46 kv circuits needs to be confirmed by HECO Distribution Engineering.

Sincerely,

*Brenner Munger*

JMP;JR/gs

cc: Jennifer J. Keveno,  
Dames and Moore

A Hawaiian Electric Industries Company

**Dames & Moore**

1144 10th Avenue, Suite 200  
Honolulu, Hawaii 96816  
(808) 735-3385  
Cable address: DAMEMORE

December 4, 1985

Mr. Brenner Munger  
Hawaiian Electric Company, Inc.  
P. O. Box 2750  
Honolulu, Hawaii 96840-0001

D9

Dear Mr. Munger:

Response to Comments  
Draft Environmental Impact Statement  
Proposed Ewa Marina Community  
Ewa, Oahu, Hawaii

Thank you for reviewing the Draft EIS. We have received your letter of October 22, 1985, and offer the following response to your comments.

1. Paragraph 4.6.2 Water Supply has been changed to note that development of the Waiau Springs project has been deferred.
2. Paragraph 4.6.6 on pages 4-13 and 4-14. Annual consumption estimates for the proposed development were based on HECO's load data for similar residence communities. Electrical requirements for the development will be confirmed by HECO System Planning. These clarifications will be incorporated into the Final EIS.
3. Paragraph 5.13 Public Utilities
  - a. The "Fort Weaver" substation has been changed to read the "Ewa Beach" substation.
  - b. The first sentence under Section 5.13.1 has been changed to read, "Electricity for the Honouliuli Plains is generated at the Hawaiian Electric Company Kahe Plant, is transmitted to the Ewa Beach Substation, and is then transmitted through 46 and 12 KV circuits located on the road network adjacent to and around the mauka periphery of the proposed project."
  - c. The sentence describing the 12 KV "transmission" circuit has been changed to read "distribution" circuit.
  - d. Final design details will be coordinated with HECO to identify the specific location of the existing 12 KV and 46 KV circuits.

Yours very truly,

DAMES & MOORE

*Jennifer J. Keveno*

Jennifer J. Keveno  
Assistant Environmental Scientist

JJK:ob(2446A/129B:13822-001-11)